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Sewing and Embroidering.—J. Dowling and F. T. Young, 366*n*. G. F. Dawson, 3710. H. C. Gros, 3720. J. Naseh, 3758. T. E. Parker, 3811. W. Pearson, 3816. A. Heaven, 3823. H. Gardner (com.), 3833. C. Bach 3891.

Shears, Scissors, Clipping and Shearing Animals.—E. Beresford and J. Memmott, 3784.

Ship and Boatbuilding.—J. D. Ellis, 3662. J. W. Whimgates, 3678. E. Lawrence, 3741. A. Browne (com.), 3832.

Ships (Raising, Sunken, or Wrecked). W. Atkinson, 3654. J. T. Parlour and A. Robinson, 3807.

Shot, Shell, Bullets, and other Projectiles.—R. H. Courtnay, 3721. H. Defty, 3759. R. Hadfield, 3885.

Sifting, Sorting, Separating.—C. Pieper (com.), 3819.

Signals, Alarms, Conmunicating Apparatus, Conveying Sounds.—A. S. Hickley, 3552. E. French, 3569. M. T. Neale, 3576. S. Hudson, 3579. F. Leonardt, 3615. J. Hewson, 3684. G. Whitcombe, 3691. R. Purdom, 3717. G. Pickerrgill, 3854. H. E. Newton (com.), 3861.

Skates, Skating Rinks.—R. A. Ordt, 3747.

Smoke (Preventing, &c.)—R. Searle, 3570. W. Lees, 3629. J. C. T. Moursseron, 3809.

Spindles; Spindles and Flyers.—H. J. Haddan (com.), 3591. J. and J. Horrocks and E. Whalley, 3793.

Spinning and Preparing for Spinning.—W. McNaught, 3564. S. E. Lister, 3600. T. Lawson 3657. W. H. Bailey and J. Cordingley, 3669. M. Dunlop, 3708. P. Puech, 3738. T. R. Rushton and J. Macqueen, 3763. J. Crouny and A. H. Bellringer, 3773. J. C. L. and M. Jefferson, 3783. J. and J. Horrocks and E. Whalley, 3793. G. Young, 3795. A. Broadley and G. Stead, 3812. H. H. Clayton, 3844. S. Brooks and W. J. Gradwell, 3845. C. H. Chapman, 3855. G. Brooke and J. Stake, 3889.

Springs.—Lord F. Somerset, 3714. J. Bluch,

Steam and other Boilers, Cleaning and Preventing Incrustation of Boilers, Water Feeding Apparatus for Boilers.—T. Morgan (com.), 3556. R. Howland, 3616. W. R. Lake (com.), 3634. W. Menizies and C. Blackburn, 3699. H. Wedekind (com.), 3736. W. Wotherspoon, 3769. R. Baird, 3825. J. C. Hudson, 3373. A. Turnbull, 3837. J. Head and J. R. Jefferies, 3877.

Steam Engines (Stationary, Locomotive, and Marine.)—R. Eastham, 3551. D. and D. Bielock, 3563. J. Cougnet, 3853. W. Cooper, 3581. J. Lloyd, 3670. A. B. Wilson, 3624. G. Rodger, 3722. H. Vile, 3301. B. and A. B. Blackburn, 3838.

Stone and Slate, Artificial Stone and Marble, Grindstones and Millstones.—J. Pollock, 3578. J. Holgate, 3888.

Straps, Driving Bands, and Belting for Machinery.—F. Wirth (com.), 3577.

Sugar and Syrups, &c.—J. Schwartz, 3749. W. E. Newton (com.), 3765. J. H, Johnson (com.), 3865.

Surgery, Surgical Instruments, &c.—W. R. Lake (com.), 3613. H. Loewy, 3660. F. Werth (com.), 3775. Mary S. Seitzer, 3798. W. R. Lake (com.), 3818.

Telegraphs; Telegraph Printing Apparatus.—T. W. Mann (com.), 3549. F. H. W. Higgins, 3597. L. A. Brasseur and S. W. M. de Sussex, 3639. G. L. J. van der Ploer, 3726. D. D. Redmond, 3822. G. Pickersgill, 3854.

Threads and Yarns.—A. E. Healey, 3685. G. F. Dawson, 3710.

Tobacco and Snuff, Cigars, Cigar-holders, Pipe and Cigar-lighters, Smoking-pipes, Tobacco-pouches.—P. Batto (com.), 3622. W. R. Lake (com.), 3787.

Toys.—D. H. Bonnella, 3776.

Tramways and Tramway Carriages, Tramway Locomotives.—W. Brooks (com.), 3594. C. H. Beloe, 3671. T. W. Ward, 3701.

Trimmings.—T. H. Blamires, 3796. J. Toft, 3866.

Turning; Lathes for Turning.—G. Mason and A. Muir, 3560. J. Rogers, 3842.

Umbrellas, Parasols, &c.—F. Hodges and G. A. Healey, 3612. F. Barrett, 3781. J. Toft, 3866.

Upholstery (Mattresses, Beds, Cushions, Curtains, &o.)—J. Blick, 3780. J. Toft, 3866.

Valves, Taps, Stop Cocks, Plugs; Regulating the Flow and Pressure of Fluids.—G. A. Adams, 3603. W. Martin, 3636. E. W. Hammond and J. Wilkinson, 3672. W. R. Lake (com.), 3688. O. Annell, 3706. G. W. von Nawrocki (com.), 3729. F. and S. Pearn, 3870. J. C. Hudson, 3872. A. Turnbull, 3873. S. Pitt (com.), 3876.

Velocipedes.—S. Hudson, 3579. J. Jackson, 3602. F. Leonardt, 3615. W. H. Bliss, 3638. O. A. Rumble, 3681. N. Salomon (com.), 3689. R. Purdom, 3717. E. Simpson, 3779. G. Singer, 3792. A. Betton and W. Trow, 3829. J. Keen, 3851.

Ventilation; Supplying and Purifying Air for Buidings, Mines, Ships, Carriages, &c.—R. Searle, 3570. J. E. Stokes, 3599. C. G. Virgo and A. Akeroyd, 3637. J. Currall, 3645.

Voting, &c.—P. Jensen (com.), 3625.

Washing, Cleansing, and Wringing Fabrics, Yarns, and Materials.—F. Dehaitre, 3573. J. Imray (com.), 3617. J. Miller, 3675. P. Puech, 3677. F. J. Bird, 3874.

Waterclosets, &c.—W. Martin, 3636. W. R. Lake (com.), 3688.

Waterproofing, &c.—G. Ritchie and F. Upton, 3558. J. Jarvis, 3674. F. Smidt, 3679. A. E. Healey, 3685. J. Buckle and J. Salmon, 3695 R. Healey, 3740.

Waterwheels and Engines, &c. — W. R. Lake (com.), 3750. J. Hastie, 3840.

Wearing Apparel for Gentlemen, Military Outfits, &c.—G. S. Fleming, 3836. S. Pitt (com.), 3859.

Weaving, Braiding, Plaiting, Preparing for Weaving.—L. Hall, R. Smith, and D. Snape, 3561. J. Priestley and S. Bastow, 3562. H. Lee, 3572. H. Portway, 3588. T. Priestley and J. Parkinson, 3642. G. Hodgson and J. Broadley, 3666. W. J. Sly and T. Wilson, 3768. T. H. Blamires, 3796. J. Parkinson, 3846. A. Sinclair, 3847. J. Crossley, 3850. W. and H. Maudsley, 3875.

Wheels for Carriages, &c.—H. Sainsbury and H. E. Merrett, 3713.

Wheels for Machinery.—J. H. Johnson (com.), 3565.

Winding, Reeling, and Balling Yarn and Thread.—M. Dunlop, 3708. S. Brooks and W. J. Oradwell, 3845. J. Stubbs (com.), 3882.

Window Blinds, &c.—A. M. Clark (com.), 3683. J. Schalhas, 3709.

Wire-Working, Wire Ropes, Telegraph Cables.—T. Kennan, 3697.

Wood and Veneers, &c.—E. R. Andrews (com.), 3716.

⁂ *The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

IMPROVEMENT IN BOOK BINDING.

An American invention, which must shortly effect a revolution in one department of the book-binding trade, has just been introduced into this country by Mr. John Heywood, the well-known publisher, of Deansgate, Manchester. The machine, which is known as "Brehmer's Patent Wire Book and Pamphlet Sewing Machine," is constructed for the purpose of sewing together the sections of a book on tapes, which traverse the back edge of sections with iron wire instead of thread, the iron being tinned to prevent its rusting. Two of these machines are now in use at Mr. Heywood's printing establishment, and the rapidity with which the stitching of pamphlets or of sections of a book is effected, and the enormous saving of time and labour which results from their use, is remarkable. The machine is fed with the wire from spools by a pair of steel rollers, which, at every revolution, supply exactly the length of wire that is required to form little staples with two legs, resembling the staples employed for carding into cotton and wollen manufactures. Of these staples the machines makes at every revolution as many as are required for the book that is being sewn—generally two or three; but in large stationery books, where the utmost firmness is required, it will supply a still greater number. The wires are driven through the sections from the inside of the folds; and as the tapes are stretched and held by clasps eactly opposite to each staple-forming and inserting apparatus, while at the same time they are kept in close contact with the outes edger of the signatures, the parallel legs of each staple penetrate the tapes, and project through them to a sufficient distance to allow of the projecting ends being bent inwards towards each other, ahd then firmly pressed against the tapes. A girl following the old mode of stitching a pamphlet in one section with thread can only stitch 700 in a dag of ten hours, but a girl working at one of these machines would stitch 2,600 of such pamphlets in an hour.—*Manchester Courier.*

Autotype Printing.—This valuable invention, whereby unfading photographs can be reproduced, is, we are glad to hear, progressing in public favour under the working of the Autotype Printing Company.

The Amazon territory is to be opened up to British readers in a work to be published in a couple of months by Mr. Stanford, Charing Cross. This territory belongs, or did belong a few years ago, partly to Boliorci and partly to Brazil.

Reviews.

THE ART OF METALLURGY.

"The Art of Metallurgy; Including all known Processes of Electro-Deposition." By G. GORE, LL.D., F.R.S. Longmans & Co.

Dr. Gore's book is one well worthy of perusal, especially when we consider that electro-metallurgy has not been the subject of many treatises. Besides affording general information as to the history, the main principles, the general methods of deposition, and peculiarities of the different metals, it gives detailed technical information, intended for practical operators, with a list of books published, and English patents taken out, relating to the subject.

The following extracts contain information which will be new and interesting to many.

Under the head "Purity of Electro-deposited Metals" Dr. Gore states that:—

"Electro-deposited metals are by no means necessarily pure; they rarely are so, and the reason, probably, why the popular notion has arisen that they are very pure is because copper is the metal most frequently deposited, and such copper happens to be an exceptional instance of purity. The degree of purity of deposited metals depends chiefly upon the degree of purity of the solution; if that is pure, the deposit is likely to be so, unless it unites with the hydrogen liberated simultaneously with it, or with any of the constituents of the liquid, as in the instance of amorphous or 'explosive antimony.'"

In regard to which as referred to in the above passage the following statement is made:—

"Whilst engaged in depositing antimany from an acid solution of the terchloride by the separate current process, in October, 1854, I observed a singular development of heat by the deposited metal when scratched or rubbed. . . . A cylindrical bar . . . about half-an-inch in diameter, formed upon a rod of grain tin one-eighth of an inch thick, when changed by the momentary contact of a heated wire, evolved sufficient heat to melt the tin completely, and the tin ran out through a crack in the antimony, and remained liquid a short time. . . . The temperature to which the active chloride variety must be raised, either locally or throughout its mass, to produce the sudden discharge, varies according to several circumstances, but is generally about 200 deg. or 210 Fahr. in an air-bath. The discharge is not limited to one particular temperature, but cemmences between 170 deg. and 190 deg., and gradually increases in rapidity by rise of temperatvre to some point about 200 deg. or 210 deg. Fahr., when it attains its maximum, and discharges all its remaining heat suddenly."

VICTORIAN MINING REPORT.

"Victorian Mining Report." New Vol. Melbourne; Trubner and Co., Ludgate Hill.

THIS volume has only just been issued. It is sold by Trubner and Co., of Ludgate Hill. We are glad to mention it, because it deserves the attention of a large class of intelligent readers. It is full of beautiful drawings of the scenery—gigantic, solitary, wild, tesselated-looking cliffs, with lakes wooded all round in their lea; and other Australian landscapes; also of excellent maps, geological and other, and of drawings of strata and quartz mining. The volume is prepared by the Government mining staff, some of the drawings being by one of the gold wardens or magistrates in charge of gold fields. It contains a highly interesting Progress Report in the first instance, Exploration Report, Prospecting, the Hope Company's Celebrated Mine, with geological sketch map, at Running Creek, where a good deal of gold has been found. The country of said mine is occupied by lower Silurian slates and sand-stones, partly metamorphosed, owing to the existence of granite three or four miles at N.W. It would appear that a great deal of the gold has been found near the surface. There are four auriferous quartz codes worked—of which wood cuts show the vertical section of Poreprinkati Reef, Surface Plan, Horizontal Section, Plan of Slide with Shaft—an imaginary section, showing supposed throw of New Happy Valley Reef. Also office reports as of geological and mineralogical collections presented to Department of Mines, or for exchange, principally auriferous quartz and pyrites. The collections belonging to the department are exceedingly large.

The general account of N. Gippeland, Cape Otway, &c., in the earlier portion is highly interesting. This volume is more engrossing than a book of travels. The maps are very delicately drawn. Mr. Howitt is the name of the gold warden alluded to.

THERMODYNAMICS AND ASTRONOMY.

"Thermodynamics." By RICHARD WORMELL, D.SC., M.A., Head Master of the Middle-Class Corporation School, London.

"Astronomy." By ROBERT S. BALL, LL.D., F.R.S., Royal Astronomer of Ireland. London: Longman, Green, and Co. 1877.

THESE two little works are the first of an elementary series of class-books, which the publishers are issuing under the title of "The London Science Class-Books, edited by G. Carey Foster, F.R.S., and by Philip Magnus, B.Sc., B.A.

We have before now spoken as to the number of text-books issued of late years, but the editors of these class-books seem to have answered our objections.

We cannot do better than to give their own words. They say:—

"Nothwithstanding the large number of scientific works which have been published within the last few years, it is very generally acknowledged by those who are practically engaged in education, whether as teachers or as examiners, that there is still a want of books adapted for school purposes upon several important branches of science. The present series of Elementary Class-Books will aim at supplying this deficiency. The works will all be composed with special reference to school-teaching; and, whilst they will be suited to the capabilities and comprehension of boys and girls during their school course, they will afford trustworth and accurate information, presented in such a way that it may serve as a basis for more advanced study. In conformity with the special object of the series, the attempt will be made in all cases to bring out the educational value which properly belongs to the study of any branch of science, by not merely treating of its acquired results, but by explaining as fully as possible the nature of the methods of inquiry and reasoning by which these results have been obtained. Consequently, although the treatment of eaeh subject will be strictly elementary, the fundamental facts will be stated and discussed with the fulness needed to place their scientific significance in a clear light, and to show the relation in which they stand to the general conclusions of science. In order to ensure the efficient carrying-out of the general scheme indicated above, the editors are endeavouring to obtain the co-operation, as authors of the several treatises, of men who combine special knowledge of the subjects on which they write with practical experience in teaching."

To those engaged in teaching, these little books will, we think, meet the object the editors have in view.

ASTRONOMICAL MAP.

E. Saieghi, 13, Pall-mall, E.

THIS map has been recently brought out in Paris, and Mr. Saiegh is the English agent. It is 5ft. by 4ft. in dimensions. The whole upper part, constituting half of the map, contains the firmament in beautiful blue, with all the constellations and heavenly bodies, including sun and moon. The space below is occupied with an excellent astronomical treatise or teacher, in not very difficult French. There is a frame work containing illustrations of all sorts of stars, satellites and meteors, with text. This map deserves the attention of Astronomers Royal as well as the Governors and Professors of universities, colleges, and schools. Varnished on rollers, in which form it may be obtained from Mr. Saieghi; it may be also suitably suspended in private studies, and its beauty and modern character are so much in its favour, and though the text is in French, this, so far from an obstacle to its being placed in the schools, should, in these days of enlarged education, be considered advantageous rather than otherwise.

PRACTICAL EVOLUTION.

IT has been reserved for a German lady, Fraulein Marie Von Chauvin, to accomplish one of the most remarkable feats in evolution on record—the changing of an amphibious gilled double-breathing animal into one that is a lung-breathing and land inhabiting. The subject was the Mexican gilled salamander or axolotl. As far back as 1867 Dumeril noted that, out of many hundred of these creatures in the Jardin des Plantes in Paris, thirty lost their gills and assumed the form of the distinct amblystoma, a true land salamander, breathing air only by lungs. No cause could be assigned for this change, as all the axolotls were exposed to precisely similar conditions. Nor did the excision of the gills of one that had not changed throw any light on the matter, because a new set of gill tufts soon grew out again.

Fraulein Van Chauvin owes her repeated success to gradually accustoming the animal to life on land and exercising constant care as to its health and diet. Five strong axolotls were selecied and were first kept in shallow water. Here they did not thrive, and the bolder measure of putting them directly on land was resorted to. Tepid baths twice a day kept up cutaneous respiration, and during the intervals between the baths wet moss was packed against the bodies. The mode of feeding was ingenuity itself. An earth worm was inserted in the axolotl's mouth as far as possible. Then the worm's tail was pinched until it wriggled so far down that the axolotl was obliged to finish the swallowing whether he liked it or not. Three of the animals persistently ejected their food, and, after fifty days' sojourn on land, died, or rather committed suicide, by starvation. The survivors, however, even after a few days showed a marked decrease in size of gill tufts and tail fin; before long, when put in water, they struggled to get back to land. Further changes went on; the skin was cast repeatedly, the gills slowly disappeared, and the gill clefts closed. The eyes became larger, and the skin, from being black and shiny, turned brownish violet black with yellow spots. Finally, the amblystoma form was assumed and with the amblystoma nature, the animals developing an astonishing greediness.

It is stated that the gills and tail fin seemed to shrivel by actual drying, through the action of the air, and that they were not absorbed by the vital processes of the animal itself. This is considered by Prof. Huxley to be a most interesting point, as it shows how the first air-breathing amphibia may have been evolved from double breathers by a succession of dry seasons, that is, by purely mechanical causes.—*Scientific American.*

Proceedings of Societies.

QUEKETT MICROSCOPICAL.

SEPT. 28TH.—H. Lee, Esq., President, in the chair.—Five new members were elected, and a number of donations were announced, including a valuable binocular microscope, presented by Mr. Crouch. Mr. C. Stewart gave a lecture "On the Histology of the Human Skin," in the course of which he described and figured the minute structure of its different layers with its system of blood-vessels and lymphatics.

SOCIETY OF ENGINEERS.

OCT. 1ST.—Mr. T. Cargill, President, in the chair.—The paper read was by Mr. G. W. Usill, "On Rural Sanitation."

ENTOMOLOGICAL SOCIETY.

OCT. 3RD.—Prof. J. O. Westwood, President, in the chair.—Mr. W. L. Distant exhibited a specimen of the ravages *Dermestes vulpinus* in a cargo of hides recently imported from China. The hides had been found on arrival to be swarming with this insect in all stages.—Mr. McLachlan also exhibited a piece of wood riddled with borings of the larvæ, and which had formed part of a case containing hides from Shanghai.—Prof. Westwood exhibited drawings of the pupa of a species of Phryganea, which swam about in water like a Notonecta, but used its middle legs as oars.—Prof. Westwood also made remarks upon the homology of the mouth-organs of the pupæ of Trichoptera, and suggested that the mandibles are for the purpose of eating their way out of their cases.—Prof. Westwood next exhibited a small lepidopterous insect from Lake Nyassa with a pupa case of a Tachina which was supposed to have been bred from the cocoon. The President then referred to the lepidopterous larva attached to the homopterous larva which had been given to him by Mr. Wood-Mason at the last meeting, stating his belief that the relation of the former (Epipyrops) to the latter was probably that of parasitism, the lepidopterous larva feeding on the waxy secretion of the homopterous larva. — Mr. Wood-Mason stated that he was inclined to consider that the Epipyrops was probably a messmate of the homopteron, to which it had attached itself for the purpose of being carried about to its food-plant, and had covered itself with the waxy secretion for the sake of concealment.—Prof. Westwood next exhibited a moth from Brazil which had been bred by Mr. Bates from a caterpillar found among the hairs of some animal.—Mr. Meldola stated that the longicoan beetle from Birkenhead exhibited at the last meeting had been identified by Mr. C. Waterhouse as *Mono. hammus titillatus*, Fab., from the United States. Mr. Meldola exhibited a collection of Lepidoptera formed in 1875 in Ceylon and the Nicebar Islands.—Mr. H. Goss exhibited a series of *Lycæna Arion* taken in the Cotswolds, and which were remarkable as one-third of the specimens were considerably below the average size.—Mr. McLachlan read a paper "*Nutiothauma Reedi*, a remarkable new genus and species of Neuroptera from Chili, pertaining to the family Panorpidæ."—Mr. A. G. Butler communicated a paper "On the Lepidoptera of the family Lithosiidæ, in the Collection of the British Museum."

MICROSCOPICAL SOCIETY.

OCT. 3RD.—H. C. Sorby, Esq., President, in the chair.—Numerous donations to the society were announced and acknowledged. —A paper was read by the President, "On an improved method for distinguishing the Axes of double-refracting Substances," which consisted of a wedge-shaped piece of quartz cut parallel to the positive axis of the crystal, and made to slide into the eye-piece of the microscope in the same way as a micrometer. When thus passed across the field of view in polarized light every gradation of tint was successively produced by the varying thickness of the quartz, and by viewing crystals through this it was very easy at once to determine the position of their axes by noting the effect upon the series of coloured bands produced by the quartz scale.—A paper by Mr. F. H. Wenham, "On the Aperture of Object-glasses," was read by the Secretary, in which the errors in the usual methods of measurement were pointed out, and means for their elimination were suggested, a clear distinction being made between "angle of field" and "angle of aperture." The purport of Mr. Wenham's paper was further explained, and illustrations of the method proposed were drawn on the blackboard, by Mr. J. E. Ingpen. Further observations upon the subject were also made by Messrs. C. Brooke and H. J. Slack.—Mr. Slack described some curious observations made as to the habit and power of offensive attack by the genus Diglena upon Anguillula and other species.

EXPLOSIVE BULLET WOUNDS.

THE war now raging in the East has assumed so much the character of a war of extermination that any question as to the kind and quality of the missiles employed sinks into comparative insignificance; nevertheless, from time to time each combatant has complained that the other has used explosive bullets. These missiles seem to be peculiarly objectionable to the Russian military authorities, and it is worth while to inquire what an explosive bullet really is, for though the term has been freely used, the ideas connected with it are probably somewhat vague. The bullets in question have been used by sportsmen for many years, and their effects upon animals have been thoroughly tested. They are, of course, made of lead, and are cast in a mould of such a form that the bullets, instead of being solid throughout, have a cylindrical hollow extending from the apex nearly to the base. The hollow is filled with gunpowder, which is capped with an explosive mixture consisting of chlorate of potash, oxide of antimony, and sulphur. A plug of wax fills up the orifice and forms the apex of the bullet, and a little spirit varnish over the wax makes the "shell" complete. This bullet is tolerably safe to handle, though a blow on the apex, will, as a matter of course, produce an explosion. When projected from a rifle and meeting with a resisting substance, the bullet explodes, and forms an irregularly-shaped, more or less jagged, pieces of lead, from which portions may fly off. If it strikes the soft parts, say of a limb, it may penetrate an inch or two before it bursts, and in that case, the aperture of entrance differs in no respect from that of an ordinary bullet; the aperture of exit, however, will form a large, irregular wound, perhaps as large as a crown piece. Such a bullet striking the thorax or abdomen is likely to lodge and produce very speedily fatal results owing to the shock and hæmorrhage which it causes. In sporting parlance, such a bullet has great "stopping" qualities, but in a military point of view it has certain disadvantages. It will not ricochet, for it bursts on striking the ground; it would very rarely injure more than one man, as its onward movement is checked by the explosion; it is not suitable for long ranges, its flight not being so steady as that of a bullet of uniform composition; and lastly, its use involves a certain amount of danger. Why it should be objected to on grounds of humanity is somewhat difficult to conceive. The wounds inflicted by fragments of shells fired from guns of larger calibre are often much more extensive and horrible than any that could possibly be caused by rifle bullets. If a line must be drawn somewhere, it surely would be more logical and more humane to exclude the greater missiles, for the smaller one has disadvantages of its own such as are likely to prevent it from ever being brought into common use in warfare.—*Medical Examiner.*

WEAVER'S IMPROVED NATURAL VENTILATION APPLICABLE TO AND SELF-ACTING SYSTEM OF PUBLIC BUILDINGS, OFFICES, APARTMENTS, SHIPS, RAILWAY CARRIAGES, STABLES, &c.

THIS system of ventilation consists essentially of two parts, viz., inlets for the supply of air, and outlets for the removal of vitiated air, and in the application of either or both of them. For public halls, churches, hospitals, and large structures generally, the inventor employs an injector ventilator, same, for example, being fixed in the windows, walls, or doors. The outer portion towards the external atmosphere is a scrubber or air purifier, arranged with a series of gills in deflecting plates, against which the air impinges, so that the blacks, smuts, smoke, dust, or other impurities strike and are thrown down. A stream or jet of water may also be purified at the upper part of the scrubber, or in any other position so as to wash or cool the air before passing into the building, or the plates may be omitted.

The gills further check the entrance of too great a quantity of air when a strong wind blows upon the apparatus.

From a reservoir the air is tilted upwards by striking upon a series or deflecting plates placed at a suitable angle.

Drafts are avoided by fixing the gills at such a distance apart that the inlet is always below the level of the outlet, further assisted by a deflecting plate placed at any angle to suit varying requirements, so that the air is either shot or diffused into the building above the heads of the occupants.

The several openings, either inlets or outlets, may further have provided perforated plates, gauze, or other material to stream or diffuse the air. The inflowing current may also be regulated by a counter-poised valve.

The extractor ventilator for the removal of the exhausted or vitiated air consists of a tube of any required shape, curvilinear, square, or oblong, placed in the roof, walls, or chimneys, controlled by the action of a self-regulating counterpoise valve moved by the out-going air current. The action of the extractor is assisted by arranging the exit and protected by a cone at a higher level than the inlet when the outlet is into the external atmosphere. With regard to smaller structures, Mr. Weaver, in his specification, states:—

'I adapt the following modifications: for rooms communicating, in old structures, with an inner-hall, lobby, or passage, whilst varying the arrangements to suit existing buildings, I prefer to fix the injector ventilator substantial the same as above described, without the scrubber, reservoir, and deflector battery. The valve is also self-regulating by the inflowing current, and admits the requisite quantity of air; entire immunity from drafts is secured by the deflector plate placed at a proper angle, not being vertical nor horizontal, though it may be further provided with perforated plates, gauze, and such like, to diffuse the air. The position of fixture of the apparatus may be in the doors, windows, walls, chimneys, heating and ventilating stoves, ranges in fire places. A modification of the extractor ventilator consists of a tube or box fitted with a self-acting regulator, which draws out the proper quantity of vitiated air from the apartments without draughts to the occupants. All the several valves in all the apparatus close when not required to pass air either to or from the apartments; and back draughts are also avoided by the closure of the valves. In an ordinary house apartment the apparatus is preferably fixed in the chimney breast wall a little below the ceiling or cornice line over an aperture and thorough into the smoke flue; but it may also be fixed in the door or above the lintel in the upper part of window or in the walls. The whole system, whether injectors or extractors, placed within the dwelling house or public building, is adapted to ornamental and artistic treatment of design so as to obviate the common objection to such appliances on the ground of unsightliness, and same may be made pleasing and unsuspicious objects of adornment, and may be prepared of any shape or figure.

In this extractor ventilator the up current is obtained by the natural tendency of heated or warm air to ascend, aided by the form or configuration of the tube or box of which the inlet for the passage of exhausted air for the apartment or place must be at a lower level than the air outlet into the chimney flue or other space or screen (that may be an artistic work or other ornamentation) fixed in front of the apartments. In other positions of outlet in the smoke flue or other upcast shaft the extractor apparatus may have its exist end lengthened by a vertical or oblique pipe to assist the draft; when such outlet or tube is directly into the external atmosphere it may be protected and assisted by a cowl or louvres attached to its upper extremity. The novelty and utility of this invention consists in cleaning the air before admission into the building, when such cleansing is desirable, as in crowded and closely-built places, introducing and causing the air to flow at an inclined angle and elevation by aid of the deflector, as to avoid unpleasant and objectionable draughts; also regulating the entrance of the proper quantity of fresh air by valves depending for action upon a natural law of motion of air aerated by varying temperatures and the affinity of air to ascend wherever the process of combustion of animal matter, or lights or fuel is going on, so that the requisite amount of pure fresh air is furnished so as to maintain the atmosphere of the building or apartment of a uniformly pure and wholesome quality, equal, or nearly equal to the condition of the external air; to suit the varying circumstances of the presence of many or few persons, with or without fires and artificial lights, the entire system being self-acting and regulating, requiring no aid or help from any person or external source.

The operation is assisted by the extractor ventilator controlled by the self-regulating valve acted upon by the outgoing current, which is in unison with the inlet apparatus. The objections common to mere openings into the chimneys or other spaces, by which draughts, smoke, soot, smut, and dust are admitted into the apartment, are avoided in this extractor ventilator by placing its opening from the apartment at a lower level than its outlet, whereby back draughts are prevented, but where there is a disposition towards a reversed down current, which I find very rarely occurs, and under exceptional circumstances only, it is obstructed by the valve at once closing. As the valves are constructed to open to the fullest capacity of the several inlets and outlets, the passage of air corresponds to the sectional area of the boxes or tubes, which is the actual and not merely nominal capacity of the apparatus. The quantity of air entering or passing away from the apartments or buildings is determined by the velocity of currents, and these currents are governed by the differences of temperature, and to these natural laws the apparatus is designed so that the supply of air per individual freed from draughts is fully equal to the maximum quantity considered by the best authorities as necessary. In the application of the system as an improved mode of ventilation to a private house or other bog throughout, I preferably ventilate the principle entrances with an injector apparatus so that a gentle air circulation is kept up in the various passages, halls, staircase walls, acting as horizontal or vertical upcast shafts, in connection with extractor ventilators fixed at the heads of the stairs in the highest parts, or in the roofs, dormer, windows, or skylights.

The basement, containing the sculleries and kitchens, is separated from the upper inhabited portion of the house, so that fumes and odors suggestive of culinary operations, are not circulated above. From the lobbies, passages, halls, or staircase walls, I obtain the necessary air, which may, if needed, be previously warmed to supply the various sitting and sleeping apartments or chambers, conducted by the injector-ventilators placed in the doors or internal walls, whereby the breathing air of the whole building, and of every room within it is maintained of good quality, and much superior to what is usually present in the majority of habitations. In railway carriages, coaches, or other vehicles, I prefer to ventilate by placing the injector ventilator in some of its modified forms in the windows, sides, and roofs of the conveyances, and avoid draught by the deflective plates. Railway or other carriages subject to the entrance of dust and dirt, may have the same excluded by means of the scrubber with or without water. For tunnels and underground locomotion, the air of the coaches may be further purified by charging the washing water with various caustic alkalies or earths, so that in addition to the mechanical cleansing such deleterious gaseous matters, as the several oxides of sulphur and carbon form chemical union with the dissolved salts, which thus become fixed and removed from the atmosphere.

The extrator ventilator may be fixed in roofs or sides of the carriages and the exit, and so arranged as to improve the current through the carriages if desired by the motion of the train against the outer air.

The apparatus may also used for ships.

The patentee of this invention is Mr. Richard Weaver, of Studley Road, Clapham Road, London, S.W.

DONNELEY'S IMPROVEMENTS IN STEAM ENGINES.

THIS invention relates to the following improvements, viz.:—

1st. A mode of employing steam in a semicircular motion produced by means of two moveable or reciprocating abutments forming demi-circumferences or segmental pistons, and turning in opposite directions in a cylinder formed of two circumferences.

2nd. A mode of employing demi-circumferences working with one or two axes or shafts, and imparting a semicircular motion to the said shafts.

3rd. A mode of converting the said semicircular motion into a continuous circular motion by two or three cranks and one, two, or three connecting-rods.

4th. The employment of a single cylinder or of several double cylinders.

5th. The employment of steam pressure applied to packing pieces and on wedges.

6th. The employment of steam at low, at medium, high and low, and at high pressure, or of any elastic gases.

7th. The application of this engine formed by the above-mentioned combination of parts as a suction and forcing pump.

The object of the engine arranged as above-described is to diminish friction as well as to reduce the amount of space occupied as compared with engines as hitherto constructed having the same power.

1st. The friction is considerably reduced by the employment of movable abutting pistons which move one over the other during the whole of the stroke, and which by their contact intercept the passage of the steam; in engines of great power these abutments being made movable in their larger diameter in the same way as the segments of pistons as constructed at present, and acted on so as to bring them into contact with each ether.

In constructing pumps one of the abutments is provided with a packing of india-rubber or elastic substance, in order to prevent leakages, which might otherwise be occasioned by the passage of foreign bodies which might be present in the water.

2nd. By the proximity of the packing pieces or valves to the centres which intercept the passage of the steam, in order to enable it to act effectively throughout the whole of the stroke.

The engine occupies little space, as piston-rods are dispensed with, so that an engine having the same power, the same stroke, and the same length of connecting-rod will only be two-thirds of the height and length of a corresponding engine constructed according to the system adopted at present.

Two moveable abutments, which for better explanation I will assume to be at the upper extremity of their stroke, and the sliding valves about to commence admitting steam, in order to cause the said abutments to re-descend.

The distributing slide-valves are worked by one and the same excentric keyed on to the driving shafts but in engines which are required to work in either direction. Stephenson's link-motion may be employed with two excentrics.

The packing pieces or tongues work over the lesser diameter of the moveable abutments, and are pressed against the latter by means of steam conducted from the boiler through an orifice provided for the purpose in the said packing pieces or valves; springs may be employed to press them, but it is necessary that the tension of such springs should be somewhat in excess of the pressure exerted in the cylinder, in order that they may continue constantly in frictional contact with the moveable abutments.

It will be seen that the two axes of the abutments are usually connected together by two toothed sectors, one of which sectors carries a crank. The connecting-rod connects the crank with the other crank which is fixed upon the driving shaft turning in bearings. The semicircular motion of the crank is thus converted into a continuous circular motion by means of the connecting-rod and the crank.

In very powerful engines each of the axes is provided with a crank and a connecting-rod united to a cross-head working in slides. A third connecting-rod will impart the rotary motion to the crank fixed on the driving shaft. In like manner the rotary motion may be obtained by means of two driving shafts, which may or may not be connected together by toothed gearing.

The axes should be of sufficient length to admit of a support being placed outside the toothed segments.

In conclusion, it may be observed that the steam cylinder with a double circumference contains the movable abutments upon which the force of the steam is caused to act. The brass frictional packing pieces work against the two movable abutments, and serve to prevent the passage of steam from the side on which it is being used to the side which is open to the exhaust. The patentee is Mr. Donneley, of 1st Neumaunstrausse, 24, Hamburg.

CREEKE AND SHARP'S PATENT SEWER VENTILATOR.

THIS invention consists of an improved sewer ventilator which is constructed directly over the sewer. A ventilating shaft, with socketed sewer pipes inserted into (or rising out of) a capped sewer pipe, or cap adjusted to the existing sewer, rises to within about 2 ft. of the road surface, over which is placed a double cylinder of cast metal, of salt-glazed stoneware, or other suitable material structure, the annular space of which is open at the top and bottom, thereby forming a water and sludge chamber capable of allowing the water to percolate away and the sludge to be cleaned out occasionally, as may be required.

Into the top of this shaft is inserted a cylinder, preferably made of zinc, having a galvanized wire-net bottom, and at the top a truncated cone cylinder so proportioned that the central aperture allows of a direct upward current and escapement of the deoderized sewer gas, while at the same time it protects the charcoal or other deoderant deposited within the cylinder from the wet and dust of the storms and road traffic by sloping same into the sludge chamber. Above this arrangement isd place a strong metal ventilating cap, for the shape of which a circle is preferred, comprising a hinged cap and its rebated periphery or frame, the hinged cap having a solid centre or disk so proportioned as to cover and protect the cone of the charcoal cylinder; while round it are the apertures for allowing the escape of the deodoured gas to the open air. The curbing-stone round this circular frame and cap should be slightly sloped to the road surface, so as to offer some additional protection by causing the rainfall to drain from and into the grating. These ventilating shafts and cylinders may be of any diameter, from 14 in. to 18 in. or 24 in., and be either circular or square, but preferably the circular. The object of this combination is to allow of a direct and unimpeded current of air to ascend from the sewer, which in its passage becomes deodoured by the slow combustion or oxidation which takes place during its passage through the 'charcoal placed in the cylinder, which charcoal should be from 4 in. to 8 in. or 10 in. thick, and be laid lightly, free from such dust or small particles as would lay solid. The patentees of this invention are Messrs. Creeke and Sharpe.

SMARTT'S IMPROVED CEMENT, &c.

THIS invention, as recently specified, is intended for facilitating the preparing, and for the application and use, and for the perfecting or finishing, or one or more of them of the firmer cements, compounds, or substances, that is to say of cements, compounds, or substances which more or less resemble in the manner in which they can be conveniently used, the cements, compounds, or substances prepared of, or from, gutta percha, India rubber, balata, pitch, and similar or equivalent gums, resins, or substances, whether the same be simple or compound, or for facilitating the preparing articles or surfaces to be treated, and putting them in satisfactory order when treated, whether the cements, compounds, or substances be used for the purpose of cementing or joining two or more surfaces or substances, or simply as a coating to resist moisture or wear, or for ornamenting, or for other reason or purpose.

This invention consists in attaching one or more of the said cements to an iron or other handle of suitable dimensions, form, and construction, and in attaching to the said handle in more or less permanent manner, or in having, as part of the said handle, either one or more instruments or appliances of any material, form, and construction, suitable for facilitating the several beforementioned operations; the several parts of the invention may be changed or varied considerably in materials, form, construction, and arrangements, to adapt it to the various circumstances or conditions under which it may be expected to be used or adopted. Though I prefer for all ordinary purposes only to use one kind of cement, which should adhere well, should be sufficiently strong, waterproof, and elastic, and should wear well. Such cement should be attached to a handle, consisting preferably of oval, half-round, or round iron, about $\frac{3}{8}$ in. average diameter, and about from 12 to 18 inches long, and that to the said handle there should be cast, or otherwise attached, a piece of steel or hard iron, about $1\frac{1}{2}$ inches across, about $\frac{1}{4}$ inch thick at the centre, and thin at the sides, and with one or more sides sharp, and one or more sides serrated, and having sufficient sharp points or teeth. It may be advisable to attach two or more kinds of cement to a handle when qualities or conditions are required which are not in or with one cement, or for other reasons. For ordinary use, the handle before described will be found inexpensive and useful, but for cementing under some conditions or circumstances, it may be advisable to increase or decrease the length of thickness, or to change the form, construction, or material. The handle may be of two or more pieces, for being made to slide as a telescope, or for other purpose, a projection, to act as a rest or otherwise, for preventing the cement, when soft, from touching and adhering where not required, may, with other such additions, be attached to the handle when considered necessary. The iron handle may be used heated. When no more cement is attached to a handle than is to be used in one operation, it may be attached to the end of the handle, and when the said cement has been transferred to the surface operated upon, the handle may be heated for use. When larger quantities are attached, it will generally be found better for these to be not at the ends, which will enable the latter to be heated and used. A non-conducting substance may be used when considered necessary to prevent heat passing to the cement from the handle, when the latter is used heated. I find wood half-an-inch in average diameter sufficient for small quantities of cement, and a little less in first cost than iron. Wood may be used with advantage with larger quantities of some cements; but others, when being finished or shaped, will adhere to wood, or to the hand, or to many other things or substances, unless these be kept moist, or unless a non-adhesive powder or other coating be used. Copper, and other substances from their tendency not to adhere or from the heat they convey, are useful for smoothing or shaping the cement; but while one or more of these may be used for one or more parts of this invention, I do not recommend them for general use because of their cost. The appliances before described, though useful for general purposes, cannot be used on some uneven surfaces, or under some other conditions. In such cases, and for ornamental or elaborate, or other more or less exceptional work, I make the appliances of the same or other suitable materials, and of more or less elaborate construction, and use as many of them with each handle for each work as may be found necessary. I attach the appliances by casting, by screw, by cement, or in any other suitable manner, to the handle. The handles, or the appliances, or both, may be used either heated or moistened, or in any other condition, and either with or without, saucepans or heating vessels or instruments, or other additions, instruments, or appliances, unconnected with this invention, for moulding the cement, or otherwise completing the work, in a plain or an artistic manner, as well as for the several other operations more or less connected with the use of the cement. The patentee is Mr. Walter Smartt, of Buckhurst Hill, Essex.

JONES' RAILWAY-SIDING GUARD.

THE object of this invention, which is termed the "Railway Siding Guard," is, as this name implies, providing security for vehicles placed in sidings, and consists of brackets or lugs bolted to a rail where required, to which brackets or lugs is hinged a stop or derailing block or plate. This block or plate is so designed that supposing a vehicle to be impelled against it with unusual forcc, the flange of the wheel comes against a flange in the said block or plate, placed in such a way that the wheel mounts it, the result being that the vehicle is immediately derailed, and thus effectually prevented from leaving the siding. But with the application of not more than ordinary force, the vehicle is stopped without any derailment. Or the flange may be so constructed that the wheel will pass over it, and the vehicle be stopped without being derailed, although unusual force be applied. The block or plate, when across the rail, can be secured with lock and key, and when opened for the ingress or egress of vehicles does not offer any obstruction, as no part of it need be above the level of the rail. The brackets or lugs, and block or plate, may be made of steel, iron, or any other suitable material, and can be used on either the right or left rail, as is most convenient.

Its simplicity of construcrion, its cheapness, and the safety it affords, combine to give it great advantage over the existing chock blocks. Mr. Jones' address is Highland Railway, Inverness, N.B.

PAWSON'S IMPROVEMENTS IN TAPS.

IN the screw taps or cocks used for water, either hot or cold, or for steam, and in ball cocks or taps, the valve is usually composed of a disc or piece of rubber or leather with or without metal portion, fitted to the end of the spindle, which opens and closes the cock or tap. But such arrangement of valve has been found to be very liable to leakage, and also difficult to repair.

In carrying out the invention the following arrangements (taking, as an instance, the screw tap) are generally adopted.

The chamber for the valve is somewhat lengthened, and in same is placed a ball of rubber or elastic material, said ball resting against the seat.

The screw spindle, which in ordinary screw taps is provided with the valve, terminates in a cup-shaped piece, which closes over said ball, and prevents the ball finding its way into the outlet opening of the cock or tap.

Thus, by these arrangements, when the cock is closed, the ball rests firmly on its seat.

When the cock or tap is to be opened, it is unscrewed in the ordinary way, and the pressure of the water forces the ball of india-rubber or elastic material from its seat; the cup-shaped portion of the screw-spindle guiding, as it were, the ball, and preventing the same from going into the outlet opening.

It is evident that the cock or tap may in some cases be made self-closing; this is done by the pressure of the water holding the valve to its seat. The patentee of this invention is Mr. Pawson, of 37, Westgate, Grantham.

A MEETING.—TO DAPHNIS.

ONE moment, and I held your hand,
  My happy eyes looked into yours;
I knew again their sweet command,
  Which awes, e'en when it most allures.

One moment! you were pass'd, and yet
  Around, above there linger'd still
Strange influence full of vague regret,
  For hours which haunt us 'gainst our will.

Bright hours, unheeded in their glow,
  That moment all their charm contained!
For, from that passing glance, I know
  Our sacred friendship is unstained.

V. GONVILLE D.

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SESSION 1877—1878.

MEMBERS' MEETING.

Thursday, November 29th, "Patent Law Conference."

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts. F. W. CAMPIN, Sec.

N.B.—The movement for the REDUCTION OF PATENT STAMP DUTIES *is still on foot; those who wish to support it should at once communicate with the Secretary.*

Proceedings of the Institute.

THE Executive Council met on Thursday, 25th October, F. H. Varley, Esq., C.E., F.R.A.S., Chairman Ex.-Co. Inventors' Institute, presiding, when the arrangements to be made for the Session which is to commence on the 29th November were considered. It was agreed that it would be desirable to have an Inventors' Dinner, to take place, if possible, on 29th proximo.

The accession of several new members was announced.

Monthly Notices.

The East India Association has been busying itself with the Famine Question, and, as previously mentioned, the Depreciation of Silver. In regard to the first, it is proposed to plant trees in numbers, as trees are planted on waste hills in Scotland, and thereby to draw moisture, and to create and keep up a proper system over the country, which would probably employ the scientific officers for a time. Secondly, as many of the silver coins in use have been obtained from Mexico, and, for other reasons, we recommend a book just published by Hachette, "L'or et l'Argent," by the author of works on Californian mines. The book goes into extraction, and largely into money.

The "Christianismi Restitutio" of Michael Servetus, a book which came originally from the press in 1553, but was scarcely *published*, though it cost the author his life. Dr. Mead, the well-known physician of Queen Anne's time and the early Georgian era, had proceeded some length with a reprint, when the sheets were seized and destroyed by order of the Bishop of London. Another physician, Dr. de Murr, superintended more successfully a re-issue in 1790, but this volume is nearly as rare as the original. The prospectus, which is signed by Drs. Davidson and Willis, invites subscribers to forward their names to either of the editors, promising that the volume will be put to press as soon as 250 are received. The price is not to exceed a guinea.—*Athenæum.*

The Society for Promoting Christian Knowledge have in the press, "Christians under the Crescent in Asia," by the Rev. E. L. Cutts, who has lately returned from an official visit to the Christians of Kurdistan, made at the instance of the two Archbishops.

Diorrexine.—This explosive, largely manufactured and used in Germany, has been analyzed by M. Fels, and found to consists of picric acid, wood charcoal, beech sawdust, nitrates of potash and soda, sulphur, and water.

The Caxton Exhibiton.—After all expenses are defrayed, will, it is hoped, result in realising a considerable surplus in favour of the charity.

Mr Mechi, the Agriculturist, has prepared a work which he purposes leaving as a legacy to his fellow-countaymen. It will fill three octavo volumes, and will contain an exposition of the thoughts and doings of his age from his own point of view.

Mr. Thoms contemplates the publication of a collection of his miscellaneous papers, on popular and antiquarian subjects under the title of "Notes and Notelets, Literary and Historical."

The "Dictionary of Music," projected by Messrs. Macmillan and Co., is going on favourably, and the first part will, we understand, be published very shortly. The delay in the publication is caused by circumstances entirely beyond the control of the energetic editor.

Messrs. Crosby, Lockwood & Co. promise the following scientific works during the season:—"Tramways, their Construction and Working: comprising a History of the System, with an Analysis of the various Modes of Traction, a Description of the varieties of Rolling Stock, and details of Cost and Working Expenses, with special reference to the Tramways of the United Kingdom;" "A Treatise on Slate and Slate Quarrying, Scientific, Practical, and Commercial," by Mr. D. C. Davies, F.G.S.; "The Construction of Roads and Streets," in two parts: 1, 'The Art of Constructing Common Roads,' by H. Law, C.E.; 'Recent Practice in the Construction of Roads and Streets, including Pavements of Stone, Wood, and Asphalte,'" by D. K. Clark, C.E.; new editions of Youatt's "Complete Grazier," and Donaldson's "Suburban Farming," brought up to the present requirements of Agricultural Practice, by Mr. Robert Scott Burn.

A Treatise on Chemistry by H. E. Roscoe and C. Schoslemmer is in publication by Messrs. Macmillan and Co., Vol. I. having been already issued.

Dr. T. A. Conrad, whose name is associated with "Notes on American Geology," died on the 9th of August, at Trenton, New Jersey. In 1832 he published his earliest geological work, "Fossil Shells of the Tertiary Formation," his last paper being published in February, 1877. He strongly advocated the doctrine, first suggested by Agassiz, that "the theory of periodical refrigeration alone can explain the sudden extinction of whole races of animals and vegetables.

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NOVEMBER, 1877.

AMERICAN PATENT SYSTEM.

Patent reformers in this country often direct attention to the Patent System of the United States of America as a model for our own legislation on the subject, and therefore it may not be useless to consider how far this favourable view of that system is well grounded; especially as we shall have to show that it has been, to a great extent, adopted, because the true nature and operation of the Patent Laws of America are not fully understood here;—certain peculiarities of those laws which appear to be advantageous to inventors and the progress of invention being dwelt upon, whilst the other points of the law are entirely ignored, Now, the truth of the matter is, that the American Patent Law is very similar to that in force in this country from which it was itself derived, and it may well be disputed, whether in those points wherein it differs from our own it is so much superior as it is generally thought to be.

Perhaps the principal point of difference will be found in the fact that the English Patent Law recognizes only the true inventor who first publishes his invention on taking out a Patent, whereas the first inventor has in the United States an important *status before patenting;* and whilst in England no valid patent can be obtained for any invention which has been published or publicly used, whether by the inventor or any other person prior to the date of the patent; in America, an inventor may use and publish his invention for a limited period *before* he obtains a patent grant. So far the American law seems to be superior to our own; but in practice the superiority vanishes, for this very provision of that law opens up the flood-gates of fraud and chicane, by permitting oppositions to be made to the granting of patents on the ground that before the application for a patent was made the same invention was first invented by some other party than the one making such application; and an opponent may prove priority of invention by showing that he had constructed a model or machine, and made some trials or use of the invention in some quiet out-of-the-way place; and as he need not have given any notice to the Patent Office, he may substantiate his case, if he does not mind doing so, by hard swearing, which is reported to be not altogether an unknown practice.

Another point of difference usually spoken of as one of superiority, is that although in England a patent is granted to any one at his own risk upon his bare statement that he is the true and first inventor, and that the invention is novel and useful; yet in the States all these matters are inquired into by a body of official examiners. Here, again, we may truly say "all is not gold that glitters." That this examining body is a very efficient one, and that it often does good service in preventing the repatenting of many old nostrums, must be admitted by all conversant with the matter; but captious, nay even ridiculous, objections to the grant of Letters Patent on the part of the examiners are by no means unknown, to contest which with ultimate success will lead an unfortunate inventor into a sort of petty chancery suit, which is not inexpensive, for he may carry his case from the primary examiner to the Examiners-in-Chief, and if not then successful may appeal to the Honourable Commissioner and according to a recent case (Sargent's), may invoke the aid of the Secretary of the Interior, and finally *in extremis* may take his case before the United States Court. All this being quite independent of oppositions made by persons who assert that by the grant of a patent they will be legally aggrieved.

But when all difficulty in regard to the examination has been surmounted, what has the inventor obtained as the result of this elaborate enquiry—an indisputable patent? No. For whenever he may be called upon to prosecute an infringer, he will find that the very same pleas against his patent can be opened up as under the English Patent Law. His title as originator may be objected to—so may the validity of the subject matter, and of his specification; as also the novelty and utility of his invention. Moreover all these difficulties are likely to arise in regard to valuable and important inventions; others will probably pass undisturbed through the ordeal.

Beyond all this there is yet another point, which is however not held up as a mark of superiority except by the unthinking —that is, the system of requiring every applicant for a patent to deposit a model—a practice which chokes up the Patent Museum with useless conundrums (the only relief being a Fire, such as recently occurred), and which causes inventors to incur a vast deal of unnecessary cost; so much so, indeed, that taking into account the liability of the occurrence of the expensive proceedings above described, it may be safely stated that although the Government charges are much lower than those of the United Kingdom, yet the cost of a patent in the United States is in the long run not much less than one for this country.

As some may suppose that we have taken a prejudiced view, we will conclude by quoting a case recently noted by our ably-conducted contemporary, the *Scientific American*:—The Board of Examiners-in-Chief refused the claim of James Greaves for a patent on the substitution of polygonal shafts and corresponding sleeve-shaped revolving bearings for round shafts and splines on the cylinders of a carding machine. The condensing cylinders were represented as several feet in length, and were arranged in parallel rows, between which passed the material that was to be condensed. For the accurate and successful operation of the machine, it was necessary that the opposite cylinders should be exactly parallel; but it was found that, upon the end to which the pinion was applied for rotating the cylinder, the round shaft, with its spline, pressed upon by the pinion in its rotation, was rapidly worn, and to such an extent that, after a use of comparatively few months, the end of the shaft would drop and leave the upper and lower cylinders out of parallel with each other. On the other hand, the polygonal shaft being kept from rotation within the pinion by means of its corners instead of the spline, the wear was distributed more uniformly; and further than this, when in operation, the forcible rotation of the pinion acting upon the corners tended to hold the shaft, even when worn, in an exactly central position, so that the wear, although as great perhaps as in the round shaft and spline, became a matter of comparatively little importance, so long as the shaft was of sufficient size to be turned by the pinion. The Commissioner held that, while a polygonal shaft is generally a well-known equivalent for a round shaft and spline, yet, in this particular connection with the condensing cylinders, the former performed a new and highly important function, not contemplated or called for by any of the previous uses, and was therefore patentable. So that after a deal of trouble and expense, Mr. Greaves is to get his patent, which may afterwards be disputed at law upon the above stated grounds!

ALISSOFF'S IMPROVEMENT IN PROCESSES OF PREPARING SURFACES FOR PRINTING MUSIC.

THE main object of this invention is to rapidly and economically produce surfaces or plates for printing music, an object which is attained in the manner hereinafter described, reference being had to the accompanying drawing.

At the present time there are in use two processes, principally for the preparation of plates for printing music. The first is similar to that used in the production of ordinary printed matter—that is, the different signs or types used in musical typography are set one after the other, so as to compose a complete musical stave. As each sign, however, is divided into several characters, this work is very tedious, and requires in the compositor so much practice and attention that a printing-plate for music prepared in this way is very expensive. The second process consists in engraving the notes on soft metallic plates, and although this process is greatly facilitated and simplified by the use of special tools and punches, it necessitates the employment of skilled and highly-paid engravers, and demands constant attention on their part in order to prevent mistakes. In this case, also, it is difficult to correct minor errors, and those of greater importance, such, for instance, as an omission of a defective arrangement of the bars, necessitates the re-engraving of the page in which they occur.

The process which is employed in this invention greatly facilitates and simplifies the work, and is as follows:—The staves, notes, and other signs used in music, preferably from three to four times the usual size, are first printed on sheets of unsized paper, which are either transparent or translucent, and these sheets are then cut up, and the staves are arranged in type-cases like ordinary metal types. The composition is then set up by simply pasting on a suitable background, first the staves, then the notes and signs, in accordance with the manuscript which is to be printed.

When the paper on which the notes and signs are printed is not perfectly transparent these notes and signs should be affixed with a gum which has the property of rendering the paper on which they are printed transparent, in order to render visible the staves over which they are pasted. Vignettes, and other ornamental matter with which it is desired to embellish the sheet, are also printed upon strips of similar paper, and applied in the same way.

After the sheet has been properly prepared, it is photographed, being reduced to the desired size by the camera, and from the negative the design is printed on stone by the usual photo-lithographic process, or when printing-plates for use in an ordinary press are required they are produced by any of the usual photo-relief or photo-engraving processes.

The inventor prefers to use as a background a sheet of glass or other transparent material, behind which he places a sheet of paper ruled closely with vertical and horizontal lines, which act as a guide to the compositor, and much facilitate the proper spacing of the bars, and the regular disposal of the notes and musical signs on the staves. A few of the small and simple characters required might be cut and stamped directly from black or coloured paper; but the greater number of characters will, of course, have to be printed on the strips of paper, as described.

Among the advantages of this invention may be mentioned the following:—First, the characters used being three or four times the size of ordinary musical signs, they can be handled with great facility; second, errors in composition can be readily corrected by removing from the background the strip or strips of paper on which the error occurs; third, stereotype-plates of any required size can be produced after the composition is once set up; fourth, highly-ornamented lithographic titles or vignettes may be used on the sheet of music; fifth, the printing of music may be carried on without incurring the expense involved in the purchase of a stock of metallic signs and characters, or engravers' tools and punches, and as the work can readily be performed by women or children, the employment of high-salaried compositors or engravers is rendered unnecessary.

The invention may be applied to the production of elaborate and ornamental title-pages for books, or other works besides music, and to any works in the production of which costly engraved plates have now to be used, such as maps, charts, &c. The patentee of this invention is Mr. Alissoff, of Lime Street Chambers, City, E.C.

OAKESHOTT'S IMPROVEMENTS IN STOVES.

THE object of this invention, which has been recently specified, is to introduce fresh air from the outside, or air external, to the stove, so as to warm a chamber or building by means of a stove with air chambers and tubes, arranged substantially as hereinafter described with the view to produce perfect ventilation.

The fresh air is brought from the outside of a building by a tube or other means to a chamber at the base of the stove.

Above this chamber the open or close fire-brick or fire-clay stove is arranged, cased in iron, with an iron outer case, closed at the top and bottom.

Between the inner and outer cases an iron or suitable metal tube (or tubes) is (or are) fixed so as to deliver the fresh warm air over the top of the stove into the room, or for its conduction elsewhere as desired. The admission of air may be cut off by a valve or damper when desired. The patentee of this invention is Mr. Oakeshott, of Sloane Square, S.W.

RITCHIE'S IMPROVEMENTS IN HEATING AND LIGHTING.

MR. CHARLES RITCHIE, of Brixton, is a gentleman who has for years past devoted himself to the improvement of the means of heating, lighting, and ventilating, and has secured several patents, which have met with the approval of competent judges. But of these no one is more noteworthy than that in which he deals with the vapours arising from the combustion of coal gas, highly injurious to health, and greater in volume than is generally supposed, exceeding, as they do when condensed into liquid form, a half ounce to every foot of gas that is burned. These vapours contain sulphurous acid, carbon, and other deleterious matters, which, especially the sulphurous compounds, have great affinity for water, and may hence be got rid of by comdensation. The object of this invention is to condense the vapours and separate them so far as possible from other products of combustion; also to heat and ventilate the apartment in which the gas is burned for illuminating purposes. Siphonic action results naturally from the arrangement of passages or flues so that the combined currents of heated air, vapours, and products of combustion from the gas flames at burners are curved downward and then upward through a long circuitous route, whereby the heat becomes mostly radiated or absorbed from the travelling vapours, and the vapours and gases, being rendered heavier than the air, fall to the bottom of the apparatus, where condensation takes place. The noxious substances are thereby eliminated, and the heated air and certain light products of combustion pass on into an apartment which is ventilated by the constant change of air without the delivery of noxious matter into the same.

ANOMALIES IN THE TEMPERATURE OF THE BOILING POINT.

IT has been observed that the mere contact with certain surfaces retards the boiling. For instance, in a metallic vessel water boils with perfect regularity, and at a temperature properly corresponding to the pressure to which if is exposed; the vapour bubbles which develop on all points of the walls of the vessel are very small, and follow one another with perfect regularity. In vessels of glass and porcelain, to the contrary, the vapour bubbles develop only at few points, which are always the same. The bubbles are large, and do not follow one another with rapidity. The temperature of water boiling in glass vessels is also higher, often as much as 2 deg. Fah., than the temperature of water boiling in metallic vessels under otherwise the same circumstances.

The boiling of sulphuric acid takes place in glass vessels only with intermittent impulses. The temperature rises above the regular boiling point, until at the bottom of the vessel a large vapour bubble is formed, the appearance of which is always accompanied by a lowering of the temperature. Such irregularities in the boiling are easily avoided by throwing platinum wire on the bottom of the vessel containing the liquid.

Water deprived of air, and enclosed in a glass tube from which the air has been exhausted, boils only at a very bigh temperature. A water hammer, which is arranged as described, may sometimes be heated to 275 deg. or 300 deg. Fah. without the water boiling; when, however, the boiling commences it is so sudden and explosive that the glass tube bursts in fragments.

Dufour found that a liquid may be heated far above its normal boiling point without actually boiling when it is surrounded with another liquid of higher boiling point, in which it will not dissolve. If water is graduallo poured, drop by drop, on linseed oil heated to 220 deg. to 230 deg. Fah., the drops fall slowly through the oil without showing the formation of any vapour, while this only takes place when they come in contact with the bottom of the vessel, when they boil away violently, and steam passes rapid upward through the oil. By mixing some fatty oil with a liquid may be obtained, which, when hot, has the same specific gravity as water, and in which globules of water, of various diameters varying from 1-20th to 1-8th of an inch, will remain suspended without rising or falling. By careful heating the temperature can be raised to 250 deg., and even 340 deg., before the water commences to boil. When, however, a drop of water so heated comes in contact with the side of the vessel, or with a solid body, such as a wooden or glass rod, it boils at once away with great violence, almost explosive.

That this property is not confined to water, but to other liquids, has been proved by various trials, So, for instance, when chloroform, which, when heated by itself. boils at 142 deg., is poured in a solution of chloride of zinc, brought to the same specific gravity by proper dilution, the chloroform globules will remain suspended and the solution of chloride of zinc may be heated to 200 deg. or 212 deg. before the chloroform will boil; but also here the contact of any solid body will cause it to flash into vapour.

All these phenomena are explained by the fact that liquids adhere very strongly to certain solids, and more to glass tpan to metal. But that iliquids adhere still more to other liquids, even when they do not intermingle (such as water to oil or chloroform), is proved by the last-mentioned interesting experiments of Dufour, in which the water globules suspended in a mixture of two oils of the same specific gravity, also demonstrate the mutual adhesion of the water particles, in the same way that in the experiment of Plateau the suspension of oil globules in a mixture of water and alcohol, of the same specific gravity, demonstrates the mutual adhesion of the oil particles. But the experiment of Dufour is the most remarkable, demonstrating as it does how the effect of heat in separating the liquid particles and changing them into vapour needs the contact of solid bodies to be effective, and may be counteracted to a certain degree by withdrawing the liquid from the contact of any solid body, by supporting it floating in another liquid.—*Scientific American.*

SUN SPOTS AND FAMINE.

It has been surmised that some relation exists between sun spots and prevalent weather on the earth, and the theory has been proposed that periodic variations in climate bear some relation in recurrence to the cyclical periods when the sun spots are most or least numerous. Dr. Hunter, Official Director-General of Statistics, has recently directed the attention of the Government of India to this alleged connection between the periods of maxima and minima sun spots and the amount of rainfall at corresponding times in the Madras Presidency, where a great famine is now impending. General Strachey, however, in a recent communication read before the Royal Society, after a careful examination of the recorded rainfalls in Madras, Calcutta, and Bombay for the past sixty-four years, comes to the conclusion that no real connection has been established between rainfall and sun spots, and shows that, even if such were apparently the case as regards Madras, the same would be true in Calcutta and Bombay, whereas the rain tables of those localities show no such coincidence.

INTERESTING FACTS ABOUT METALS.

Platinum, the densest of the ordinary metals, possesses also one of the highest points of fusion. The metal fuses when exposed to the heat of the oxyhydrogen blowpipe, and is quite readily fused in very small quantities by the aid of a hot blast supplied to an ordinary Bunsen gas flame. Platinum belongs to the class of metals which soften before they attain perfect fluidity. This peculiarity gives it the valuable property of welding, or the uniting of surfaces without the use of solder, and enables the finely-divided metal, technically termed the metallic sponge, to be wrought into a solid and compact bar. Platinum is not known to be volatile, though perhaps, at sufficiently high temperatures, it, in common with all substances, would be vapourized. Platinum does not combine directly with oxygen, and therefore would not be wasted during the process of melting.

Gold melts at about 2,016 deg. to 2,190 deg. Fah., according to differnt authorities. It is neither affected by water nor air at any temperature, and is not attacked by ordinary acids. It is the most malleable of all the metals, and may be beaten into sheets of surpassingly wonderful thinness. Its very great malleability renders it unfit for use for jewellery or for coinage until its hardness, and consequent durability, are increased by alloying it with silver or copper. Exposed to the heat of the oxyhydrogen blowpipe, it is known to be vapourized; and it was formerly supposed that it was not volatile at lower temperatures, but the researches of Napier and Makins show that volatiliaation occurs at temperatures of an ordinary muffle furnace when alloys of silver and gold are cupelled with lead, An analysis of deposits taken from the chimney of a small reverberatory furnace, in daily use for cupelling gold for months, showed 14 per cent. of silver and 7·1 grains of gold for every 8 oz. of silver. Still, aftea the destruction of a lot of jewelery by a fire, a great proportion of the gold should be recoverable, since but a small quantity, if any, would be volatilized; and the metal is not at all affected by air or water, as before remarked.

Lead melts at about 630 deg. Fah. Unlike gold, it combines readily wito the oxygen of the air, forming various oxides—mainly litharge, a product of the direct oxidation of the metal. When melted and exposed to the atmosphere, it absorbs oxygen very rapidly; so that, unless caution be exercised in melting, it is apt to waste from the direct oxidation, and especially from the fact that, at a white heat, it boils and volatilizes. When in a very finely-divided state, metallic lead combines so rapidly with oxygen that it takes fire while falling the air, and burns with a red flash. This metal possesses the valuable property of welding in the cold, provided the surfacei joined are clean and free from oxide. Lead forms alloys with nearly all the metals. Many of its alloys are of great value. It alloys but imperfectly with copper, cobalt, nickel, and iron. The following are some of the more important alloys:—

Alloys.—Type metal, an alloy consisting of 83 parts of lead and 17 parts of antimony, with sometimes a little zinc. This alloy, heated in the air, rapidly loses its antimony by oxidation—the antimony oxidizing at a lower temperature than the lead; the oxide resulting from the action always contains, however, according to Watt, a large percentage of the oxide of lead.

Stereotype plates sometimes contain $\frac{3}{4}$ part tin; music stereotype plates contain, tin 12 parts, lead 7 parts, and antimony 1 part. The general composition of ordinary stereotype plates is: lead 70 parts, antimony 15 parts, and bismuth 15 parts; this alloy expands on cooling, and is, therefore, applicable for casting stereotyye plates.

Solders.—Lead alloyed with tin forms various solders; fine solder contains 2 parts of tin and 2 of lead; common solder, equal parts of tin and lead; coarse solder contains, lead 2 parts, tin 1 part; plumber's solder is the same as the last.

Pewter is composed of 80 parts lead and 20 parts tin, but to these copper, antimony, or zinc is generally added. Lead alloyed with tin and bismuth forms a variety of alloys that are remarkable for their extraordinarily low melting points.

Rose's fusible alloy, formed of 2 parts of bismuth, 1 of tin, and 1 of lead, melts at about 95 deg. C., or 203 Fah., or less than the boiling-point of water.

Britannia metal is an alloy of equal parts of brass, tin, antimony. and bismuth; or, better and safer, 100 parts of French pewter, 5 of antimony, and 5 of brass.

Bronze contains copper, tin, and lead.

Bell metal contains 5·6 parts of zinc, 10·1 parts of tin, 80 parts of copper, and 4·3 parts of lead. All of the foregoing alloys are more or less wasted or dissipated by the action of heat, owing to the ready oxidation or volatilization of the lead, or of some one or other of its constituents.

Silver melts at about 1873 deg. Fah., or at about a bright red heat. Like gold, it is nat attacked by air or moisture—the tarnish which appears on silverware being caused by gaseous compounds containing sulphur, which are frequently present in the air. A very extraordinary property is possessed by silver of absorbing a considerable number of times its oxygen when highly heated in that gas, or even in common air. This oxygen is not combined with the silver, but is given off at the moment of solidification of the metal—a circumstance which produces the arborescent appearance common to masses of the pure metal. The presance of a small percentage of copper prevents the absorption of oxygen. According to Lampadius and Depretz, silver gives off vapour at very high temperatures. The presence of a small quantity of arsenical vapours greatly increases the ease with which it is volatilized.

Bismuth melts at about 518 deg. Fah. It is but little oxidized by contact with air; if strongly heated, it burns with a bluish flame; at a high temperature it volatilizes freely. It is obtained from its ores by simply exposing them to heat.

Copper melts at about 2100 deg. to 2200 deg. Fah. It is very ductile, malleable, and tenacious; at very high temperature it is slightly volatile; it is unaffected by dry air, but in the damp becomes coated with an adherent green crust. When exposed at a red heat to ihe air, it is rapidly oxidized, and becomes encrusted by a black scale. At a high temperature copper burns with a green flame.

Nickel is somewhat less fusible than pure iron; this would put its melting point at about 3000 deg. Fah. Likd iron, it is capable of becoming magnetic, but loses this property at temperatures above 660 deg. Fah. Though combining readily with oxygen, it is not oxidized when highly heated, since heat drives off the oxygen as fast as it is fixed.

Cadmium melts at about 500 deg. Fah. It is commonly associated with ores of zinc, and being a very volatile metal distils off when zinc ores are roasted.

Manganese has a high melting point, but fuses wnen exposed to the heat of a good wind furnace. It has a strong attraction for oxygen, and will even take it from water at low temperature.

Iron, intrinsically the most important of the metals, fuses at temperatures dependent on its purity. When containing carbon, or in the condition of cast iron, it melts at 2786 deg. Fah., but when pure, or in the condition of wrought iron, a temperature of 3280 deg. Fah. is necessary to melt it. Iron softens before melting, and possesses in a marked degree the property of welding. It has powerful offinities for oxygen, taking it from the air when moist—a circumstance which explains the fact that it is seldom found in a pure or metallic state, except in meteorites. Dry air at ordinary temperatures does not affect it, but when heated to redness it absorbs oxygen and becomes coated with a scale of black axide. When in a finely-divided state, the metal burns while falling through the air, and even in the condition of ordinary fillings it burns with brilliant scintillations when thrown into o fire or the flame of an ordinary gaslight. Its high point of fusion renders it an admirable protection of woodwork against ignition from neighbouring fires, though its rate of expansion, as shown in the table, somewhat vitiates its protective action in case of fires, from its tendency to warp from unequal expansion,

Tin melts at the temperature of 455 deg. Fah. It is not acted on to any extent by air or water. When exposed to a temperature somewhat above its melting point, it absorbs oxygen greedily, and is converted into a whitish oxide, known technically as pasty powder.

Zinc melts at about 770 deg. Fah. It undergees a series of remarkable changes under the influence of heat. At ordinary temperatures it is comparative brittle; between 250 deg. and 300 deg. Fah. it is quite malleable, and in this state may be readily rolled or beaten into sheets, which have the valuable property of retaining their malleability when cold. The brittleness of the metal at ordinary temperatures is doubtless to be attributed to its crystalline structure, which is probably effaced during the operation of rolling at higher temperatures. At 400 deg. Fah. zinc becomes so extremely brittle that it may be readily powdered. Zinc is very volatile at a bright red heat, and in the presence of air burns with a bluish-green flame.

Antimony melts at about 800 deg. Fah. Like zinc, it boils and volatilizes, but at a higher temperature—this phenomenon occurring with zinc at a bright red heat, and with antimony at a white heat. It is unaffected by air at ordinary temperatures, but will, if sufficiently heated, burn with a white flame.

Aluminum has a melting point intermediate between that of zinc and silver. It is a good conductor of electricity, being about eight times a better conductor than iron; is also a better conductor of heat than silver. It has an exceedingly low specific heat, and therefore does not take a long time to liquefy. It has been subjected to high temperatures in closed vessels without exhibiting any tendency to volatilize. It is not oxidized by the air even at a strong red heat.—*American Exchange and Review.*

THE PATENT LAWS.

THE subject of the Patent Laws was brought before the Trades Union Congress at its recent sittings at Leicester. Mr. Memmott (Sheffield) moved "That this Congress regrets the delay in placing the Patent Laws of the country upon a satisfactory footing, and desires the Parliamentary Committee to continue their efforts to secure to the inventor by reasonable payments, the benefits of his invention." He argued that the tax on inventions in this country was calculated to drive ingenious men from our country. They were sent away by the fact that if anyone had an invention for which he sought protection, down came the Government with a tax, and if he had not sufficient money to carry out his invention, he had either to sell his idea to his master, or get to another country where the tax was not so great; hence the fact that there was a great deal of competition from other countries where men of genius had gone to produce their inventions. What they wanted was, that a Bill should be passed favourable to the poor inventor whose genius was such as to enable him to see rather further than his acquaintances, and not that the benefits should be crushed out by taxes and other charges which were now imposed.

Mr. Gilliver (Birmingham) seconded the resolution, and hoped the Congress would be unanimous upon the matter.

Mr. Weiler (London) proposed as an amendment that the question be not entertained.

Mr. Adams (London) seconded the amendment.

Mr. Turner (Sheffield) considered that genius should not be hampered by the restrictions of Government upon patents. He did not suppose that anyone wished to take away from the Patent Laws all the restrictions, but they should not be so severe as they were; so that if a man had got anything about him to produce something for the benefit of the community at large, it should be given to the community without the man having to pay such a large amount for it. He thought that was one of those unjust and hard restrictions put upon working-men which the sooner it was abolished the better.

Mr. Broadhurst said some took a view with regard to patents which was wrong. The cost of patents was the very reason of preventing a poor man taking out his patent, and in many cases men have been robbed of the fruits of the labour of their brains when capitalists made their fortunes, while the working man, from whose genius the invention was made, died in poverty. It was necessary in this country to encourage inventions. (Applause.) In America a patent could be had for a song, and in consequence, industrial advance was made with giant strides, and not with the halting pace which was usually adopted in this country.

The resolution was carried unamiously.

FOREIGN SCIENCE.

M. Bonneval d'Abrtgeon has invented a 'Telegraphe Universelle." The object of the inventor is to facilitate the study of telegraphy in schools, colleges, &c. He says he demonstrates all laws, and refers to Oerstede, Ampere, Nobili, Seveiger, Beequerel, &c., his merit lies in the combination in a small space and in simplest conditions of information, giving a clear idea of the principles pre-eminent in the construction of special and costly apparatus, facilitating the material teaching of one of the most important branches of physics.

The Imperial Academy of Sciences of Vienna seems to be entirely occupying itself with Geology and Natural History. We respectfully suggest the publication of some views on practical science. We gladly avail ourselves of an opportunity of extending these news notes beyond our glances at continental matters. We have before heard of North America as regards telegraphs and Meteorology, but the great empire and the Spanish Republics of the South have done little in these matters; though there are great fields in those regions for industrial and other development at present being thoroughly opened up by railways, in the extension of which the Argentine Republic, whither flock so many English; has much distinguished itself, and it is asserted that fortunes have been made by tramroad companies. For building purposes sixty kinds of marbles have been found in Paraguay, and there is a rage for having English machinery for different purposes there. It is lamented that there are so few cotton, silk, or wollen manufactories in Brazil, where there is so wide a field. It is worthy of notice that an iron pontoon is used for a wharf at the custom house at Santos, at which a steamer of 1,000 tons received a full cargo, and sailed in three days. Recently the custom house at Rio has been provided with hydraulic lifts and every kind of machinery. Reasonably good machinery is in use in the Buenos Ayres Western railway workshops, including a leviathan steam-hammer, a "general joiner," for planing, moulding, and a huge punching machine in the cast foundry, punching quarter inch to one inch, and cutting up to three quarter inch boiler plates. Singularly enough they are not able to make wheels for carriages and waggons, which are therefore imported. They are very much exposed in these countries to sinkings in the levels of bridges, owing to the great floods. The Governments of Brazil and Argentine Confederation deserve praise for their efforts to avail themselves of the aid of mechanical science; still we know from personal experience that many of the inhabitants of those two countries, and indeed of a number of the Spanish republics, are generally talented, and possess a great natural genius for drawing. We would therefore suggest that good engineers, architects, and surveyors would find no uncongenial state of things in South America. The Anglo-Brazilian Railway of San Paulo is noteworthy from its ascending mountains by means of a steel rope wound round; drums being attached to the train, worked by Fairbairn's engines, 200 horse power, embedded in a granite foundation, 40 feet deep. In some of the towns of the Republics, where gas is not yet thought practicable, there is a proposal to use Rowatt and Sons annexpric oil lamps without a chimney. We have been enabled to furnish some of the above news through the kind information of the publishers of the *Brazil River Plate Mail* and Mr. Hadfield. *Apropos* to lighting, they have lately tried the Jablochkoff process, in presence of MM. Halanzier and Garnier, for lighting the facade of the New Opera at Paris. After having adapted three groups of three *bougies* to each of the two great candelabra, each group being enclosed in an *ophalin* globe. To judge of the effect, they successively lighted the whole, and each side of the facade isolatedly, but a final settlement was not made. The light, it must be borne in mind, says the editor of *Les Mondes*, cannot be very powerful and very soft.

The Royal Academy of Belgium proposes prizes for the following subjects:—A complete study of the specific absolute heat of simple and compound bodies. For explanation of the state of our knowledge of phenomena known under the name of influence of masses, showing why the ideas of Berthollet have yielded to those of Proust. Indicating if possible, the course to follow to arrive at the solution of this general problem. It is announced in Madame Demorrest's fashionable journal, Paris and New York, that a scientific expedition round the world is about to sail from New York. It is for ladies and gentlemen. They are to pay something like £200 each. The first instalments of this sum go for obtaining and equipping a vessel. As soon as the passengers grow accustomed to the sea, studies and lectures are to begin, and are to proceed throughout the voyage, and all places are to be visited whence profitable instruction is to be obtained. Our go-ahead friends across the Atlantic are certainly "fixing" our continental tours, and the *Challenger*. May we be pardoned in asking if this be an attempt "to take the wind out of our sails." The translations from the French of Bergeron, published in the Turner's Manual, to which we have alluded before, present, Nos. 3—9, good instructions as to the tools used on brass and iron for both art and general purposes. The round chisel, the translator says, is the principal tool on brass; there is a hook in the one for iron.

ELECTRICAL LIGHTS.

PROF. TYNDALL and Mr. J. Douglass, chief engineer of the Trinity House, have issued their reports on the trials made in November last, with a view of observing from the sea the comparative action of the magneto-electric machines now mounted at the South Foreland. The machines experimented on were (1) Holmes's machines, which have been in use for some years at the South Foreland; (2) Gramme's machines; (3) two Gramme's machines coupled togther; (4 and 5) Siemen's large and small machines. The Corporation's steamer *Galatea* was employed for this purpose, the position first chosen being not far from the Varne Light, and at a distance of 11½ miles from the lighthouses on the Foreland. Other observations were subsequently made at various other distances. As the result of these observations, Prof. Tyndall remarks that the new machines —viz., Siemens's and Gramme's — mark a great advance both as to economy and power in the application of the electric light to lighthouse purposes. Both inventions undoubedly place at the disposal of the Elder Brethren of the Trinity House electric lights of "surpassing energy." Combining either the large machine of Siemens, the two Gramme's machines, or, if practicable, the two small ones of Siemens with one of the group-flashing dioporic apparatuses recently devised by Doctor Hopkinson, a light transcending in power and individuality all other lights now existing would probably be obtained. Such a light would displace, with enormous advantage to the mariner, the two lights hitherto displayed at the Lizard. From an inspection of the Gramme machines, and the information he has been able to obtain respecting them, Mr. Douglas is of opinion that they are not superior in efficiency to the Siemens' machines, while they are more complicated in construction and also dearer. Both gentlemen, therefore, reconmend that the small Siemens' machine be adopted for the Lizard. It is simple in principle and moderate in cost and a reserve of power can always be maintained without much outlay. By coupling two such machines together a great augmentation of the light is, moreover, attainable.

Correspondence.

PATENT LAW REFORM.

Sir,—The legislative prospect, when judged by the retrospect of the last five years of Parliamentary progress, on Patent Law Reform is not very encouraging to inventors seeking protection for their property in *brain*. Since the report of the enquiry by Special Committee in 1871-72—a Committee which may here advisedly be said to have been notoriously composed of gentlemen totally opposed to all recognition of inventive power—there has been at each recurring session a Bill as regularly introduced into the Parliamentary programme of the Ministry professing to amend our Patent Law.

Three times the subject made its *debut* in the Lords, under the control of the present Lord Chancellor; but, partly owing to the active opposition of the Officers of the Inventors' Institute, working in conjunction with other friends, it, though passing the Upper House, practically never reached the lower branch of the Legislature. But what is somewhat ominous, and looks as though the business was to have been pushed (and but for the Eastern crisis no doubt would have been), this year the former procedure in a most marked manner was changed, as, after being prominently mentioned in the *Speech from the Throne*, the Bill was brought forward and read a first time by the Attorney-General, of whom it may be here inferentially added, that he seems to have no preconceived prejudices or idiosyncracies to satisfy in the matter, but, on the contrary, appears to be honestly and disinterestedly disposed to obtain a just settlement of the present very unsatisfactory state of the law, as well as for a time to put an end to the persistent attempts at the abolition of all protections for patents, Although by deputations, and through representations (as before alluded to) repeatedly made and reiterated to the Law Officers of the Crown, each succeeding bill has invariably been an improvement in the interest of the inventor on its predecessor, nevertheless it is still more than ever requisite to urge upon inventors, and especially upon poor ones, if that they are desirous to impress any character of justice in their power upon patent legislation they must at once arouse themselves to a perception of the threatened crisis hanging over them, as in all probability, by reason of the conspicuous failures of the past years, and the continued improvement, in a liberal sense, of each ensuing measure, that a determined effort on the part of our opponents, in fear of less obnoxious provisions passing through delay, which, combined with a possible determination on the part of Government to settle the question, tends to point out the imminent probability of immediate legislation taking place. Inventors should bear in mind that, although improvements have from time to time been introduced, as is admitted, still in all the bills one very serious principle has remained which constitutes in itself an attempt to upset the inviolability of patent property, by introducing and insisting upon compulsory licences of an invention being granted by patentees—a principle which it is no exaggeration to say boldly strikes at the vitality of all patent right in its great essential of an allotted close period for private manufacturers should the patentees so think fit, and which may, too, be seriously needed in the interest of further development as an invention. This is in itself an incalculable blow, and is mainly aimed in the cause of Capital at the poor inventor.

Let us draw attention to another point. Last year's Bill somewhat deceptively introduced a system of scientific experts as an examining board of Inventions seeking patent. In itself intrinsically the principle scarcely challenges serious objection; but to e effective it must be complete, while the Government proposition falls very far short of the need it affects to remedy. It merely introduces a species of new Court of Equity, which, if really intended to practically work, must of necessity fail, from the inadequacy of the proposed staff to perform the duties imposed, and which would every day more and more accrue.

If the plan is to be real and effective, and not, as some believe, a mere machine to burk invention right, the number of examiners must at least quadruple the intent of the last year's proposed legislation.

Two other points, hitherto not much considered or dealt with by Parliament, should form the essentials of any re-settlement of the law.

1st. The incipient process for obtaining protection ought to be greatly simplified, more denuded of red-tapism, and more assured in its guarantee of right, instead of, as at present, being a mere ability to enter into legal strife.

2nd. The first costs of such preliminary process, at least, ought to be materially and sensibly reduced to a sum that could not press as a tax on the poorest artizan.

But such objects can only be achieved by some life being thrown during the next session into the agitation. It is simply suicidal for inventors to stand supinely by while their avowed enemies openly declare their intention to abolish, if possible, all protection to invention. Active opposition to insidious clauses, and the proposal of amendments to coming legislation, ought no longer be left to those few who patriotically take up the matter, and give their time and thought to it, but those whose interests are deeply interested ought to rally to their standard and by their countenance aid them.

I think, therefore, that, instead of mere negative opposition, positive action should now be taken in order to secure effectual legislation on the subject, and I think I see an outlet for securing this if the Inventors' Institute in its next session turns its exclusive attention to this subject; and, if wise, the members will instruct its officers to prepare a Bill enacting what is desired. I feel sure that either Mr. Mundella or Mr. Anderson would take charge of such a measure, and when placed thus in juxtaposition with the Government measure more attention would thus be ensured than any desultory or mere negative opposition can accomplish.—I am, &c., Thomas Mottershead.

Wandsword Road, Oct. 25, 1877.

SEMPLE'S VIOLIN FINGER-BOARD NOTE INDICATOR.

Mr. Semple, of Airdrie, N.B., sends us the following statement with reference to his invention of Improved Appliances for Certain String Musical Instruments, the specification of which he recently filed in the Great Seal Patent Office:—

"Sir,—I have now completed a rough model of my patented invention on the violin, No. 3,723, (dated 23rd September, 1876), so far as one octave only on the strings and finger-board of the violin, and this is sufficient for the learner on the instrument as he advances in a thorough knowledge of the instrument to prove and complete the whole compass of the notes on the instrument for himself. I made one suspension foundation wire pattern to show how easily it may be made with copper wire, which has little or no spring or rebound; this is what is required, so that it will remain in position, and not alter its place or form, besides it can be put into any position with a pair of thin-pointed plyers. The copy being transferred from the finger-board, where the places for the notes must be taken correctly by the assistance or help of the ear; this copy must again be transferred on to stiff paste-board, or thin piece of wood, which can be used to check the places formed by the wire to see if the points stand at equal distance from the centre where the notes should be stopped. The strings must be constantly kept in tune by the help of the cromatic tuning forks. I have prepared a small piece of wood, which I use when proving the places for the notes on the finger-board, and which has the measured distance marked for the length of string required from the nut along the string up to the top of bridge where the strings touch or pass over, so that the bridge must always be as if bound at this measured distance from the nut, for as the common clock is altered in keeping time by the pendulum being shifted, so will the notes on the strings be altered when the bridge is shifted. Too much attention cannot be given to these important points.

"I have cut into the finger-board small channels, which I consider should be called the 'accommodation excavations,' being almost indispensable for the suspension foundation wire.

"The variety of material which may be used, and its manner of application may be best ascertained by the performer on the instrument.

"As I have very little time or ability in my present circumstances for writing an article on making my invention public in your valuable journal, or wherever you may deem best, and as you know the whole facts of my case, I confidently leave the matter in your hands, and

"I remain, sir,
"Yours most respectfully,
"Daniel Semple."

THE REPORT OF THE COMMISSIONERS OF PATENTS ON TRADE MARKS.

The official statement of the working of the first eighteen months of Trade Marks Registration has now appeared. In the annual report of the Commissioners of Patents just issued, the section which will excite the greatest public interest is that devoted to Trade Marks. The Commissioners state that the Registry in Quality Court was opened on January 1st, 1876. In the first year 10,384 Marks were applied for, the number of separate applications lodged being 3,698. Marks were first advertised on May 3rd, 1876, and by 31st December, 4,031 Marks had been published in the official journal. The work of placing the Marks on the Register was commenced in October last, and up to the end of the year, 261 Marks were registered. Only 56 Marks were opposed; 2,204 Cotton Marks were applied for at the principal Registry, and the applications were referred to the Manchester Committee. Six certificates of registration were given under the section which provides that the Registrar's certificate shall be evidence of entries, &c. The peculiar use of Trade Marks in the cotton industry made it necessary to provide for a preliminary investigation into the nature of the Marks. With this view a branch office of the Registry was established by the Commissioners at Manchester; and, on the suggestion of the Manchester Chamber of Commerce, a committee of gentlemen acquainted with the usages of the cotton trade were nominated by the Commissioners to report to them which of the Marks in the cotton trade are private property, and within the meaning of the Act, and which of them are open Marks and beyond its scope. The delay occasioned by this investigation led to the passing (in 1876) of the statute deferring the operation of the Trade Marks Registration Act, 1875, until 1st July, 1877. Our readers will remember that the Act was to have come into full force precisely a year before, and that an Act of last session has still further postponed the operation of the Act so far as it relates to textile fabrics.

The Commissioners observe that the difficulty of distinguishing between Marks used as private property and as trade designations of quality, was not confined to the cotton trade. It was found impossible to settle the mode of bringing Marks consisting partly of private and partly of common elements under the operation of the Act, without the authority of the courts of law, and this was only obtained in April, 1877, in the decision of the Court of Appeal, in Messrs. Barrows' case, reported in the eighth number of *Trade Marks*.

Considerable progress in the work of registration during the present year is recognised by the Commissioners. The whole of the Marks advertised in the Journal for the period required by the Act have been dealt with, and up to the 31st July, 4,984 Marks, coming within the scope of the Act, had been placed upon the Register for goods other than cotton goods. For use upon cotton goods 42,442 Marks had been applied for at Manchester. The number would have been very considerably augmented had not the United Bleachers' Association consented to place the whole of their marks, consisting of more than 16,000, in the category of open Marks. The Marks applied for in classes 23 (cotton yarn and thread) and 25 (cotton goods, exclusive of yarn, thread, piece-goods, and clothing) have been examined by the Manchester Committee. They are now engaged on class 24, that is to say, piece-goods of all kinds.

The financial report of the Commissioners indicates that the Trade Marks Registry is the source of considerable profit to the public revenue. In the twelve months ending with December 31st, 1876, £7,664 18s. 10d. was received in respect of applications for Trade Marks; £319 6s. for registrations of Marks; £173 2s. 6d. for extra space for advertisements in the official journal; £130 in respect of oppositions; and £8 11s. 10d. for office copies and copies of certificates. The total receipts were thus £8,295 19s. 2d. The expenditure is less ready distinguishable from the general expenses of the Commissioners of Patents. The sum of £1,862, which is the only amount entered under the head of the separate expenses of the Trade Marks Registry, can hardly be taken as an exhaustive statement. But we may safely conclude that, whether by £6,000 or less, the department contributed to the surplus income of £139,067 2s. 2d., which the Commissioners of Patents enjoyed in 1876.—*Trade Marks*.

SULPHUR IN GAS.

WE extract the following from the *Analyst*, one of the best of our special journals of practical science:—

The vexed question of the amount of sulphur impurities to be allowed in gas, which for twelve months at least has been practically settled in London by the defeat of the two Bills brought in by the Crystal Palace Gas Company and the Gas Light and Coke Company, has been raised at Maidstone, where the gas on two or three occasions appears to have contained from 35 to 45 grains of sulphur per 100 cubic feet; or, in other words, to have been in this respect as bad as absolutely unpurified gas. Complaints were naturally made on the subject, and the engineer of the Maidstone Gas Works presented a report to the directors of the company, containing some statements which, to those who are familiar with the evidence recently given before the select committees of the House of Commons, must appear to be of a most remarkable character. Thus, this gentleman says, "the evidence given on that occasion by the chemists, who are alike the most eminent of the day and the most experienced in respect to coal gas, has gone to prove that a quantity of these compounds, up to about 35 or even 40 grains per 100 cubic feet, is not injurious to health; and that a partial removal is not worth the trouble and expense incurred." It is certainly somewhat singular that, if the evidence of these chemists did prove this fact, the select committee should nevertheless, as reported in our number for July, page 67, have thrown out both the Bills, and therefore kept the companies still under restrictions in regard to sulphur compounds. There is no doubt that some evidence was given of the character alluded to in the engineer's report, but this evidence was so emphatically contradicted by chemical evidence on the other side that the committee had no other course before them but to reject the gas companies' proposals.

We purpose in our next number, if space allows, making further reference to this subject, with a special view to pointing out the character of the products which are produced during the combustion of ordinary coal gas containing sulphur. It is quite evident that such a paper is needed, not perhaps so much for the enlightenment of analysts as for the information of those quasi chemists who put themselves forward to advise public bodies on such points. Thus we find in this case an argument extending over some half column of letterpress to prove that 40 or 50 grains per 100 cubic feet cannot be injurious, because it only forms about 0·18 per cent. by weight of the gas which is burned, ignoring entirely the fact that this gas in its combustion produces at least three separate ingredients in considerable quantity, namely—water, carbonic acid, and sulphuric acid. What can any percentage composition possibly have to do with a case of this kind, where the injury is done solely by the sulphuric acid which is formed? Impure gas has nearly as much influence on the death rate as impure water.

RECENT AMERICAN AND FOREIGN PATENTS.

WATERCLOSET.—Francis E. Kernochan, Pittsfield, Mass.—The object of this invention is to improve the construction of water-closets in such a way as to prevent the escape of sewer gas, and enable the supply of water to be regulated and controlled as may be required. The water pipe rises above the basin of the watercloset, and opens into a reservoir, placed at a suitable distance above said basin. From the reservoir an outlet pipe leads down to the basin, passes in through the bottom of said reservoir, and rises nearly to its top. An inlet or water pipe enters the reservoir near its top. In the side of the outlet pipe, just above the bottom of the reservoir, is formed a hole of about half the area of the inlet pipe, so that when the water is admitted a part of the water will flow out through the hole and outlet pipe into the basin, and the rest of the water will tend to fill the reservoir. Should the valves be kept open sufficiently long the reservoir will be filled, and after that the water will flow out through the pipe as fast as it enters through the water pipe. The difficulties that may arise from the varying supply of water at different places, or at the same place at different times, may be met, either by the use of a self-filling tank controlled by a floating bulb, as at present used, or by a valve connected with a separate pipe used to supply the after-wash, so that that pipe shall be always closed when the inlet pipe leading to the reservoir is open, and open when said inlet pipe is closed, so that the only entrance of water to the basin while the lifting rod is raised will be through the overflow pipe in the reservoir, and after the lifting pipe is lowered through the after-wash pipe.

BDJUSTABLE SUPPORT FOR LAMP REFLECTORS.—Richmond Henry, Glassborough, N.J.—The object of this invention is to provide an adjustable frame for attaching a reflector to an ordinary lamp or gas burner. A ring, having an adjusting screw, by which its size may be varied, is fitted to any ordinary lamp collar or gas burner. Loops are attached to the sides of the ring for receiving wires which are bent twice at right angles to form a rectangular frame, which is inclined at such an angle as to bring the reflector supported by it into the proper relation with the flame of the lamp or gas burner. A socket, which receives the shank of the reflector, is drilled to receive the ends of the wires, and is provided with a set screw, which retains the shank of the socket in any position into which it may be turned. The reflector thus mounted is capable of turning in any direction within certain limits.

BOILER FOR HEATING WATER UPON OIL STOVES OR LAMPS.—Robert E. Killip, Brooklyn, N.Y.—This invention relates to kettles in which to boil water, and the object is to obtain a very large amount of heating surface in a comparatively small space. The nature of the invention consists in a boiler which is constructed with a skirting that is extended into and below its bottom, in combination with tubes which pass through the skirting and part of the water space, and project from the interior surface of the skirting. Below the body, tubes are applied to the skirting, and arranged around it equidistant from each other. These tubes may be cylindrical or tapering, and they all project inside of the skirting a short distance, for the purpose of slightly arresting the outwardly escaping heated products, and utililizing as much of the heat as possible. The boiler is used by arranging it over the lamps of an oil furnace, or a common oil lamp may be applied inside of the skirting, when it will be found that comparatively little heat will be required to boil water in the body.

WOOD-SAWING MACHINE. — John A. Chandler, Monticello, Iowa.—A treadle is pivoted to the saw-horse and attached to a frame which extends beyond the treadle, and to which the saw frame is pivoted. Stop pins are arranged for preventing the saw from droping too low, and from being thrown too far back. A spring is attached to the frame and to the saw frame for drawing the latter downward, so as to cause the saw to bear upon the wood supyorted by the horse. To the inner end of the treadle a spring is attached, which strikes a buffer spring at each downward stroke of the treadle. A lever pivoted to the crossbar at the back of the horse, and provided with a curved serrated dog or holder that engages the surrace of the wood being sawed as the lever is drawn forward. The operation is as follows:—A stick of wood is placed upon the horse and the treadle is oscillated with with both feet, while at the same time the upper end of the saw frame is grasped by one hand and the lever which clamps the wood by the other. The wood is thus quickly sawed with very little exertion.

LIFTING JACK. — Samuel Barrow and David Barrow, Windfall, Ind.—This invention relates to lifting jacks which are designed for raising stumps, waggons, broken down fences, and for rolling logs, and all purposes where heavy objects are to be moved. A stfong standard has a base secured to it which is adapted to receive and guide a vertically movable lifting bar, and also to receive between its open cheeks the end of a lever, which is constructed with an enlarged head, having a fulcrum pin fixed eccentrically to it, and this lever is connected to the lower bifurcated end of the lifting bar by means of a bent link. The edges of the cheeks of the standard are notched to receive the ends of the fulcrum pin, and to allow the lever to be adjusted higher or lower, as may be desired. An arm is adjustable independent of the plate or bar, and is used for raising fences and supporting them while being repaired or straightened. When it is desired to use the jack or rolling logs or turning heavy beams, the plate is detached from the jack and the cant hook is attached to the lifting bar by inserting the straight portion into the hole in the upper end of this bar.

Fire Escape. — Thomas A. Andrews, Gainesville, Tex.—The object of this invention is to provide a simple and inexpensive fire escape that cannot get out of repair, and that is always ready for use. In the pulley stile of a window frame is formed a receptacle for the rope and strap of the fire escape. This receptacle is provided with a door, which, when closed, forms a part of the stile. The hinges upon which the door swings are each provided with a stop, which prevents the door from being accidentally closed. The door serves the double purpose of closing the receptacle and of a bracket for supporting the pulley and rope of the escape. A grooved pulley is journaled in a casing that is secured to the door. This casing prevents the rope from slipping from the pulley, and also from becoming knotted or twisted. The strap is attached to one end of the rope, and is provided with a snap hook or buckle, by which it may be adjusted. The rope is of such length that both ends may touch the ground. The manner of using the escape is as follows:—The window is raised above the door, which may then be opened, and when open it extends beyond the wall of the building. The person desiring to descend places the strap around the chest under the arms, and drops the free end of the rope to the ground. The escape may be operated by persons below or by the person descending. The person escaping steps out of the window, and either lowers himself or is lowered by persons from below. One person may in this manner lower a number of people. The apparatus may be placed in the wall of the building, either inside or outside, but it is most convenient when arranged in the window frame, as described.

Faucet.—Thomas A. Andrews, Gainesville, Tex.—The object of this invention is to provide a faucet which is inexpensive in its construction, easily repaired, and efficient in operation. The body of the faucet is L-shaped, and contains a passage which is enlarged, forming a valve seat, and is threaded internally to receive a screw. A lateral oblong aperture is formed in the body just above the valve seat for the escape of liquid from the faucet. The inner end of the screw is provided with a square projection, to which is fitted a packing disk, of elastic material, which is secured to the screw by another screw. The screw that closes the faucet is provided with a handle or thumb piece, by which it may be turned, and the body of the faucet is provided with a tapering portion, which may be driven or screwed into the vessel or pipe in connection with which the faucet is used. The advantages claimed for this improved faucet over others now in use are that it may be more cheaply manufactured, is more easily repaired, and is perfectly secured against leakage.

Jacquard Machinery.—Warren P. Jennings, Brooklyn, N.Y.—This invention has relation to jacquard machinery, and the nature of the invention consists, first, in the employment of a cam wheel of peculiar construction, in combination with gearing and rotating arms, for giving more positive intermittent rotation to a card cylinder during its vertical movements; second, in combining a heater with the cards, which is so arranged that the latter are prevented from being injured by moisture in the air. A cam wheel communicates a positive rotary motion to the card cylinders, giving them one eighth of a revolution at each stroke, and bringing them into proper position at the termination of every ascending stroke. The movements are so direct and timed that there will be no tendency to displace the cards on the cylinders while bringing them successively into position for operation. The chain of cards is constructed in the usual well-known manner, and near the guide roller, over which the cards pass to the cylinder, is arranged a heater, covered by a shield. This heater may be a perforated gas pipe, where it is desired to use gas jets, or a lamp or steam may be used where gas is not to be had. In damp weather cards absorb moisture and swell, so that they do not work true. To prevent this the heater is so arranged that the cards are kept dry.

Machine for Picking Stones, Etc.—Charles Fuller, Little Marsh, Pa.—The object of this invention is to furnish an improved machine for picking, hauling, and delivering stone, manure, dirt, etc., which shall be simple in construction, effective in operation, and conveniently operated and controlled. The invention consists in the combination of hinged crossbar and of U-rods, connected by crossbars with the frame work of the machine; in the combination of the adjustable crossbar and the guide rods with the hinged crossbar to which the U-rods are attached, and with the frame of the machine; in the combination of the lever provided with the slotted curved arm and the pin with the frame of the adjustable crossbar and the hinged crossbar, to which the U-rods are attached; in the combination of the notched fulcrum bar with the crossbar of the U-rods, and with the axle of the carriage; in the combination of the ratchet bars, the pawls, the rod, and the lever with the crossbar of the U-rods, and with the frame of the carriage; and in the combination of the scraper provided with the keepers and the flange socket with the lower arms of the U-rods. When the machine is to be used for handling dirt,. and other fine substances, a scoop or scraper is placed upon the lower arms of the U-rods. The scraper has two or more keepers formed upon its bottom to receive two or more of the rods, and thus keep the rear part of the scraper in position.

CHRONOLOGICAL LIST OF APPLICATIONS FOR LETTERS PATENT.

⁂ In this list (Com.) means Invention communicated from abroad.

Further information, as to the progress of these Patents by Notice to Proceed, Sealing, and Specifying, can be obtained at the Office, 21, Cockspur St., Charing Cross.

On October 25th.—4127 to 4147.—H. P. Holt. Auxiliary power steering gear for ships, also applicable to auxiliary power apparatus.—M. Dickinson and D. Cullen. Modes of and apparatus for working the slide valves of steam and other engines.—W. Sides and G. G. Rayner. Modes of and apparatus for cutting and dressing rock. —W. Sambrook. Heating and superheating the feed-water of steam boilers, and apparatus employed therefor, applicable also for heating water used for other purposes.—B. W. Tucker. Form, shape, and construction of dredging buckets, and links for working same. —J. Heald. Machine for grinding and doughing india-rubbers and their compounds for spreading purposes, likewise suitable for paints and other materials.—C. F. Wood. Roller skates, parts of which improvements are applicable for other useful purposes.—J. Brown. and H. Woodcock. Spinning mules.—J. Brown, W. Dean, and A. Orrah. Machinery for drawing, twisting, and doubling fibres. R. L. Howard. Valve gear for direct-acting steam engines. —J. E. Greatorex, and T. P. Hall. Manufacture of artificial stones for paving, building, and other purposes.—H. T. Davis. Oiling or lubricating the axle boxes of roller skates and such other parts as may require oiling, and which said invention may be applied for oiling purposes to other articles.—J. C. Wilson. Safety valve apparatus. —J. L. Haddan. Apparatus for raising water by means of compressed air (com.) —H. J. Haddan. Rotary engines (com.)—T. Dunn. Construction and arrangement of apparatus and mechanism for indicating the number of revolutions performed by wheels and other rotating machinery.—W. M. Scott. Manufacture of coil and roll tobacco.—J. R. T. Mulholland and W. M. Porter. Winding machines for making pirns or cops.—S. H. James. Screws, bolts, and nuts.—E. G. Brewer. Fish plates for rails (com.)—F. J. Bird. Improved elevators (com.)

On October 26th.—4148 to 4164.—J. Elce. Machines for spinning and doubling.—B. A. Dobson and J. Macqueen. Machinery for preparing, spinning, and doubling cotton and other fibrous materials. — M. Tomkinson and W. Adam. Manufacture of chenille rugs and machinery or apparatus therefor.—A. C. Dickson. Power looms.—R. W. Binns and C. F. Binns. Heating kilns or ovens used in the manufacture of pottery and porcelain, and for other purposes.—J. Cole. Construction and arrangement of magnetic apparatus to be employed for curative and remedial purposes.—W. R. Lake. Looms for weaving (com.)—H. W. Hart. Improved mode of and apparatus for extinguishing fire.—C. Leonard and C. Phillips. Trunk and box fastenings.—W. R. Lake. Improvements in postage and similar stamps (com.)—W. L. Wise. Machinery for rolling metallic hoops, straps, and plates (com.)—W. Hibell. Joining iron and steel wire.—H. Davey. Hydraulic engines. —J. P. Harriss-Gastrell. Means and appliances for resisting impact or supporting pressure in connection with ships and buildings (structures), such means and appliances with some modifications being available for obtaining flexibility in rinking floors and the like.—E Silver. Lathes for wood turning.—The Baron T. de Mouncie. Revolving cylinder pistols.—A. M. Clark. Freezing and refrigerating apparatus (com.)

On October 27th.—4165 to 4172.—C. D. Abel. Means and apparatus for indicating leeway and speed of vessels (com.)—C. D. Abel. Automatic feed apparatus for steam boilers (com.)—A. Jamieson. Grapnels for submarine or submerged cables (partly com.)—J. Farmer. Letter-press printing machines.—C. Maschwitz. Instrument for opening sheet metal cases, cans, boxes, and other vessels containing preserved fish, meat, or other articles of food, and for other like purposes (com.)—G. Moulton. Apparatus employed in the engraving, milling, or chasing of rollers or cylindrical surfaces.—H. P. Holt. Lubricating skate rollers, and in apparatus connected therewith.—R. M. Cameron. Convertible school desks.

On October 28th.—4173 to 4187.—J. Marsden. Tables or apparatus for playing billiards, applicable also in part to the bagatelle and other similar game boards.—R. C. Robinson. Die for moulding or shaping clay or other plastic material.—H. A. Durfrené. Fastener for attaching samples to cards, also applicable to other purposes (com.)—J. Gamgee. Apparatus for forming and maintaining ice surfaces and for cooling chambers.—W. E. Gedge. Endless or portable articulated railway for the transit of vehicles on common roads (com.)—H. Gardner. Construction of toy or imitation birds (com.) —J. E. Vanner. Silk-winding machinery.—W. Boyes. Apparatus for purifying and heating water.—J. Ferrin. Machinery or apparatus for hardening or consolidating felt hat forms.—J. P. Scott. Condenser carding engines (com.)—F. Murison. Plough.—D. A. T. Christie. Chaff and hay cutting apparatus, part of same being applicable for other cutting purposes (com.)—W. Croysdale. Apparatus employed in dyeing wool in indigo vats.—F. Weldon. Apparatus for measuring or ascertaining distances.—F. Whitehead. Sewing machines, applicable also to other machines.—F. J. Bird. Can and metallic case openers (com.)

On October 30th.—4188 to 4203.—J. B. Lindsay. Vessels for conveying or storing corrosive liquids.—D. Guy. Chimney pot.—F. Pickering. Envelopes or wrappers used or employed in extracting oil from seeds.—J. G. Willans. Manufacture of castings.—S. Townsend. Bands or cords for driving machinery and for other purposes.—B. J. B. Mills. Apparatus for fitting or setting elliptic springs (com.)—P. Pierce. Blowing fans.—L. L. M. Perls. Combined step chair and table for ironing and other purposes. —Julius Müller. Clasp or closure for albums, books, and other articles.—W. R. Lake. Machinery for making paper bags (com.)—J. Pignatelli de Aragon. Needles for hand and machine sewing (com.)—H. Barham. Construction and glazing of roofs in horticultural and other structures, and in the ventilation of the same.—A. M. Clark. Rail and tramway locomotive engines, carriages, and waggons, part of said improvements being also applicable to other vehicles (com.)—J. Watson. Utilization of sewage.

THE INVENTORS' INSTITUTE,

ESTABLISHED 1st MAY, 1862.

FORTNIGHTLY MEETINGS, DURING SESSION,
HELD (NOVEMBER TO MAY INCLUSIVE) AT
4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE, W.C.

PAST PRESIDENT—SIR DAVID BREWSTER, K.H., LL.D., F.R.S., &c., from the Establishment of the INVENTORS' INSTITUTE till his decease, February, 1868.

PAST PRESIDENT—LORD RICHARD GROSVENOR, M.P., &c., from February, 1868, till May, 1871.

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